

# THE IRON AGE

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## Grinding as a Substitute for Milling

The Role Played by Disk and Surface Grinding Machines in the Production of Motor Truck Parts at the Federal Plant

A RADICAL change in the machine shop methods in the manufacture of motor trucks with a view of materially reducing the cost has recently been adopted by the Federal Motor Truck Co., Detroit, which has substituted disk and cup wheel grinding for milling wherever possible in the machining of castings. The change was decided upon when new models were developed and the design was studied from a manufacturing point of view in order to apply disk grinding to as many castings as possible. The brackets for various purposes, as well as some other parts, are now disk ground instead of milled.

The change in the method started with the design, and the first application is in the pattern shop where the bracket patterns are made so that the castings are relieved wherever possible and only the edges and where the bolts go through have an actual flat contact. This design reduces greatly

the amount of the surface to be machined and this surface is ground on a disk grinding machine. The results obtained are claimed to be better than where a flat machined surface is provided by the milling operation.

One type of brackets used are angle brackets, such as those for the steering gear, radius rod and rear springs. It has been the general practice to mill these brackets from the solid stock and the machine work on them is claimed to have been one of the greatest problems in motor truck manufacturing, the difficulties being due to the large surfaces that have to be machined, the heavy milling machines and large diameter cutters required, expensive fixtures and high-grade labor.

In making the pattern and casting no allowance is made for metal to be removed by grinding, the over size of the casting being sufficient to take care of this. Brackets are ground within 0.002 or



The Grinding Room at the Federal Motor Truck Co.



Angle Brackets Can Be Produced by Grinding with a Cup Wheel in One-Sixth the Time Required for Milling and Expensive Machines, Cutters and Labor Are Eliminated

0.003 in., which is regarded as accurate as is necessary. Covers of transmission cases are also disk ground instead of being milled and the end flanges of transmission covers are ground instead of turned. The company is now experimenting with quick-acting cam fixtures for holding such awkward pieces as dash and cam brackets, etc., and is also experimenting in disk grinding the flat top face of transmission cases.

The grinding is done on a battery of four plain double disk Gardner grinding machines used for flat grinding, a Gardner cup wheel grinding machine for angle grinding, and a Wilmarth & Morman Co. surface machine that is used for grinding small angles. One of the illustrations shows a cup wheel grinding machine equipped with a special table finishing an angle bracket. This illustrates the method of grinding bracket castings on all right angle pieces that are riveted to the chassis frames, these brackets having formerly been milled. From the photograph it will be noticed that the castings have been relieved and no parts except the rim and the rivet spaces are ground. The metal removed is negligible and the grinding is claimed to give a truer job than can be obtained on a milling machine. It is stated that the output of this machine on the bracket shown is about 250 pieces per day.

Another photograph shows the method of grinding cone clutches, which it is stated is found superior and quicker to machining on a lathe. This operation requires about one-fourth the time taken for machining the part on a lathe and there is no scrapage. It is stated that the lathe tool has been found to tear the leather from the cone pressing and that it was found that the only way to overcome the difficulty was to grind the part.

The grinding room is equipped with a very complete dust-collecting system. The grinding wheels are covered, with the exception of sufficient space



A Disk Grinding Machine Turns Out Cone Clutches Four Times as Fast as a Lathe

left for the work, and the abrasive and cuttings are drawn from the machine through 4-in. pipes which connect with a 15-in. pipe located on the floor back of the machines. This pipe is carried overhead to an adjoining room, where it connects with a Sly dust arrester. The grinding machines are driven from one motor, which also drives the suction fan connected to the dust arrester. The arrester is equipped with special separating and baffling devices for handling the refuse. The fine particles pass directly to the hopper and into sacks beneath. The heavier material is deposited against the baffles, from which it is shaken out by a mechanical movement of the baffles after an accumulation has collected, and it drops into the hopper beneath, from which it passes into refuse sacks.

The company states that its substitution of grinding for the milling method has resulted in a very large saving in labor, doing the same work in one-sixth the time it formerly required, and a great saving in tools and material, eliminating the need of large milling machines, large diameter cutters and elaborate jigs and fixtures required in taking the heavy milling cuts.

There is also some saving of metal in the design of the castings. It is also pointed out that under the old method of milling, the casting had to be held very tightly during the milling and that it would spring back after being released, thus not retaining its shape. This is avoided in the grinding operation, as it is not necessary to hold the part as tightly as when taking a heavy milling cut.

#### Chicago Machinery Club Leases Quarters

The Machinery Club of Chicago has leased the fourth floor of the building known as Machinery Hall, Washington Boulevard and Clinton Street, practically in the heart of Chicago's machinery district, and the organization hopes to occupy its home about Sept. 15. The work of altering the space for club purposes is well started and some of the equipment has been purchased. The lease is for ten years. The club will open with a dining room capable of seating 160 people at tables of four each, a lounge, a billiard room, a library, etc.

The club has 300 members and hopes to have 500 when the rooms are thrown open. It is still seeking contributions to insure its success, as the initial cost will be between \$8,000 and \$9,000. It has raised something over \$7,000. When in operation, the cost of membership will be \$20 initiation fee and \$20 annual dues, for resident members, and \$10 initiation fee and \$10 annual dues for non-resident. Plans for the formal opening are not yet perfected, but it is probable that an official of national prominence will make an address. About Aug. 15 the club will hold a picnic. Clyde W. Beardsley of the Abrasive Material Co. is president, and Norton A. Booz of the Machinists' Supply Co. is secretary.

The Ireland & Matthews Mfg. Co. of Detroit has completed its new plant and is about ready to move into it. The main building is four stories; the first story is 120 x 656 ft., while three upper stories are 60 x 656 ft. There is also a large press building 73 x 568 ft., one story. The brass cast foundry is 56 x 128 ft., two stories, and the power house 56 x 178 ft. The total floor space of the plant is 250,000 sq. ft. and the approximate cost, \$600,000. The capacity is about 50 per cent more than that of the old plant. The company manufactures stove trimmings, sheet metal goods and automobile supplies.

The Alberger Pump & Condenser Co., 140 Cedar Street, New York, advises THE IRON AGE that it has numerous propositions under consideration for the establishment of a new plant in the vicinity of Newburgh, N. Y., but up to the present time no selection of land has been made.



## MANGANESE IN STEEL MAKING\*

### Its Important Role—Value of High-Manganese Low-Carbon Steel

BY DR. HENRY M. HOWE

**P**ASSING by the deoxidizing and desulfurizing effect of manganese as foreign to our present purpose, its effect on the mechanical properties of the steel seems to me in the last analysis due primarily to its retarding action both on the transformations and on the coalescence of the micro-constituents into progressively coarser masses, which while increasing the ductility lessens the cohesion in general, including the hardness and the elastic limit, and thus lessens the effective strength.

Before considering the retarding of the transformations by manganese let us refresh our memory as to these transformations, and as to the three prominent states of steel, between which they play:

The common low-temperature alpha or pearlitic state;

The high-temperature or non-magnetic austenite state into which the metal passes spontaneously when heated up through the transformation range, say 725 to 900 deg. C.,  $Ac^1$ - $Ac^3$ ;

The intermediate or martensitic state, in which carbon steel is caught in transit from the austenite to the pearlite state by means of a rapid cooling, as for instance on hardening by quenching small pieces in water.

The alpha state is magnetic and relatively soft and ductile, as in annealed carbon steel; the intermediate or martensitic state is magnetic, hard, and brittle as in hardened steel; while the non-magnetic high temperature or austenitic state when preserved in the cold, as in manganese steel, combines great ductility with hardness of a peculiar kind to which I will refer shortly.

In carbon steel this transformation is so rapid that it occurs to a very marked degree even in the water quenching of thin pieces, as is familiar to us in the fact that when this steel is made non-magnetic and austenitic by heating say to 900 deg. C., and is then quenched in water, it transforms as far as the magnetic, hard, brittle, martensitic state of common hardened steel even in this rapid cooling.

Most of the alloying elements, and notably carbon, manganese and nickel, retard this transformation greatly. Thus 2 per cent of manganese plus 2 per cent of carbon retard it so that in the water quenching of thin pieces the austenite state is preserved. With 5 to 7 per cent of manganese it is so slow that even in air cooling it goes only as far as the intermediate martensitic state. Hence the brittleness of these steels of intermediate manganese content. With about 12 per cent of manganese the transformation is so sluggish that the austenitic state is preserved even through a common slow cooling.

The water-quenching of manganese steel in current manufacture is not to prevent the loss of the austenitic state, but to suppress the precipitation of the iron-manganese carbide, cementite, which would occur during slow cooling. The broad plates of this cementite would embrittle the mass by forming partings of low cohesion. It is derived from the large carbon content of the ferromanganese used, the cheapest source of manganese. Carbon-free manganese steel should not need quenching.

#### Industrial Value of Manganese Steel

The industrial value of this manganiferous austenite or manganese steel seems to be due to its combination of great ductility with great effective hardness. I say effective hardness, because initially it is rather soft. My own experiments indicate that the Brinell hardness of an undeformed specimen is only 125, or that of steel of about 0.22 per cent of carbon when annealed, that of ultra low-carbon steel being about 75. But the hardness increases very greatly on the slightest deformation. Even that incidental to the Brinell test increases

the observed Brinell hardness to 223 easily, or to that of 0.60 per cent carbon steel when annealed.

This hardening under deformation is one of the first things that forces itself on the user of this material. The first strokes of the hack saw cut it rather easily, but the deformation thus set up in the path of the saw quickly causes such hardness as to bring the sawing to an abrupt end, thus giving the absolutely false impression that the material has a soft skin. This hardening causes the apparently contradictory combination of effective hardness with very low proportional limit, even as low as 28,250 lb. per square inch. The proportional limit represents the cohesion of the undeformed material, the effective hardness represents the cohesion as exaggerated by the deformation incidental to service. In the same way the act of tensile rupture may increase the Brinell hardness to 540, or that of about 0.50-per cent carbon steel when hardened.

The surface of the jaw of a manganese-steel rock crusher, deforming under the great pressure, quickly hardens itself, so that the combination of a very hard surface with a ductile back develops spontaneously. As fast as this hard surface wears away it is replaced by a new one made equally hard by the deformation which it at once receives.

This hardening probably represents in part the same cause which leads to the increase of cohesion in general, including the hardness, of all the malleable metals under all forms of deformation, such as wire drawing, and in part the martensitization of the austenite. That is to say, the arrested transformation from austenite through martensite to the alpha state which is due in cooling through the transformation range but is restrained by the retarding action of the manganese, is now stimulated by the deformation sufficiently to cause it to proceed as far as the martensitic state, with consequent hardening and embrittling effect. This martensitization through the stimulation of the arrested transformation by deformation is a common property of austenitic steels which have only a moderate excess of the retarding elements over the quantity needed for causing the retention of the austenitic state. It occurs strikingly in austenitic 20-per cent nickel steel.

The retarding effect of manganese on the structural changes of carbon steel shows itself by leading in general to finer structure, to finer ferrite masses, finer network structure, and finer pearlite, indeed probably often to the replacing of lamellar pearlite with sorbite. This greater fineness leads to better quality in general and to a higher elastic limit in particular, though of course with a corresponding sacrifice of ductility.

#### Value of High-Manganese in Low-Carbon Steel

The great value of manganese for this purpose has not begun to receive the attention which it deserves. It is probable that a manganese content of say 1.25 per cent, with a correspondingly lessened carbon content, may be used so as to lessen the danger of cracking and the residual stresses when a high elastic limit is sought, because this large manganese content in and by itself raises the elastic limit by giving a fineness of structure which otherwise would be sought by increased violence of cooling or by the use of a lower drawing temperature. In other words, the use of 1.25 per cent of manganese lessens the needed violence of cooling, and permits the use of a higher drawing temperature, in both ways tending to mitigate the residual stresses, and in the former way lessening the chances of cracking.

The Chicago, Milwaukee & St. Paul Railway Co. will build an additional 500 railway cars at its Tacoma, Wash., shops, according to A. M. Ingersoll, assistant to the vice-president of the road. The company is now constructing 1000 cars at its Tacoma shops. All the cars will be gondola type.

Employees of the Skinner Chuck Co., New Britain, Conn., numbering 167 men, are on strike. The men seek a 10 per cent wage increase, a 10 per cent bonus and an adjustment of alleged time clock troubles.

\*A paper, substantially in full, presented at the twentieth annual meeting of the American Society for Testing Materials at Atlantic City, N. J., June 27, 1917.

# Transverse Tests and Steel Structures

Equalizing of Crystallization Necessary  
Before the Best Physical Results Are  
Possible—How This Is Accomplished

—BY GEO. W. DRESS\*

ACCORDING to the use to which steel is put, many specifications call for a transverse test. The physical properties desired are often attained with much difficulty, and in many cases the steel is rejected because of failure to meet the specifications. Failures of steel tested transversely may be due to the chemical composition, but too frequently such failures are due to grain structures, because the steel from which the test was taken was not equalized preparatory to its being heat-treated.

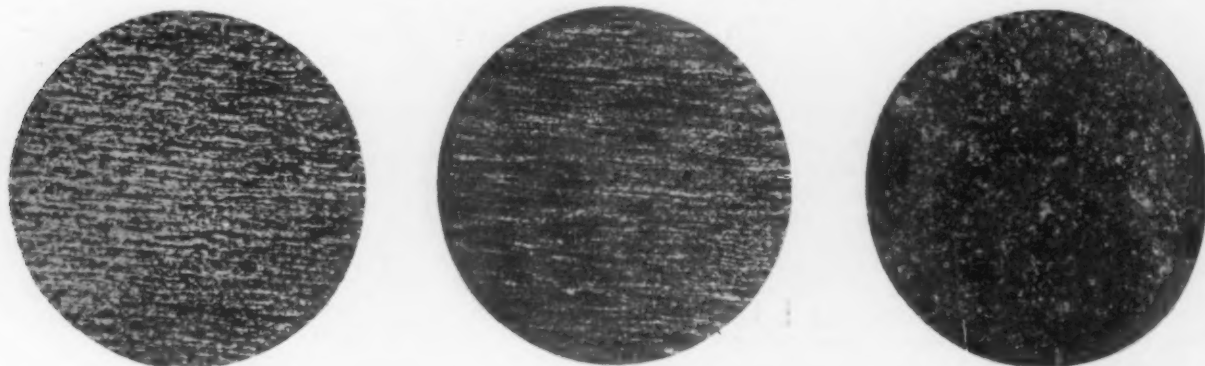
In order to obtain the maximum physical properties of steel on a transverse test, it is essential first to equalize the structure. Before explaining the method used in accomplishing this equalization so that the microconstituents in a given piece will have approximately the same arrangement transversely as longitudinally, a review of the structures will not be out of place.

During the rolling or forging of a bar of steel,

der that the elongation and reduction of area are reduced to a minimum.

A large-grained structure breaks with a low elastic limit, poor elongation and reduction of area. This applies to a longitudinal test equally as well as a transverse test. The reason for the poor physical properties of a large-grained structure is because of intergranular weakness.

By this is meant a weakness between the grains, or rather a weakness in the cell walls which surround the grains. The cell walls of commercial steel generally consist of ferrite, the softest constituent in steel, and because of this fact they are naturally weak and yielding. The larger the grains and the wider the cell walls of ferrite, the less cohesion between the grains. If the cohesion between the grains is greatly lessened because of this, we can readily see why such a steel will yield suddenly when strains are applied. The elongated grain in



The Photomicrograph at the Left Represents Rolled Plate and Reveals the Laminated Structure. The photomicrograph at the center is the same steel annealed at 720 deg. C., while the third one shows the same steel with the structure equalized at 900 deg. C., then annealed at 720 deg. C. The composition of this steel was 0.32 per cent carbon, 0.54 per cent manganese, 0.039 per cent sulphur and 0.020 per cent phosphorus. The photomicrographs are all 50 diameters

the grains and microconstituents are elongated in the direction of the rolling. The smaller the cross-section and the colder the bar when finished, the more pronounced is the elongation of the grains. In a cold-rolled bar the elongated grain and microconstituent are very marked and the structure is laminated. When the steel is medium hard, having a carbon content of about 0.40 per cent, the extent of this lamination is readily seen at a magnification of 50 diameters. These laminations will be composed of alternate layers of the microconstituents, pearlite and ferrite. The harder constituent pearlite will be arranged to form one layer whereas the ferrite or softest constituent in steel will form the other layer. Hence we have a steel made up of many layers of hard and soft constituents. It is due to these layers of alternately hard and soft constituents, pearlite and ferrite, that the physical properties of a transverse test show a decided weakness.

The general physical characteristic of a transverse test is that the steel breaks short in a testing machine with a low percentage of elongation and reduction of area. Moreover, the steel will not bend successfully. From what has been said concerning the structure of steel transversely we do not won-

der the transverse test suffers intergranular weakness directly proportional to the extent to which the grains are elongated. If the grains are decidedly elongated, the cohesion between the grains will be weakened similar to that of a steel having a cellular grain as large as is the greatest diameter of the elongated grains.

As to the structure of each individual grain, let us take as an example a steel containing approximately 0.40 per cent carbon, the grain being pearlite. Ferrite being the softest and cementite the hardest constituent of steel in the untreated condition, it is reasonable to conclude that pearlite is a medium-hard constituent. The structure of pearlite may be either granular or lamellar. In the rolled or forged steel, the structure of the pearlite grain is granular whereas lamellar pearlite is a characteristic of thorough annealing.

The remarks in this discussion apply principally to extreme cases, yet at the same time a transverse section from any rolled or forged bar comes within its scope.

There must be a complete structural change before any marked difference in the physical properties of a transverse test can take place. The elongated grain must be made cellular and the laminations and intergranular weakness must be elimi-

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nated. In order to accomplish this change the steel must be equalized—it must be treated similar to that of a steel which was overheated or burned. Ordinary annealing will not suffice, since it will have little or no influence on the structure. The temperature most commonly used in annealing is not high enough to expand the elongated grains nor high enough to break up the laminated structure.

It is a recognized fact that each increment of heat above the critical point in steel increases the grain size. Therefore a temperature of not less than 900 deg. C. or 1652 deg. Fahr. must be used in order to enlarge the grain beyond the size to which it is elongated. Simultaneously with the enlarging of the grain size we have likewise disturbed the laminations. After the steel has been uniformly and thoroughly heated, it is essential that this temperature be maintained at least one hour and, in the case of large pieces of steel, a considerably longer time is required. The rate of cooling at this stage of equalizing the structure is immaterial, the steel may cool down with the furnace or it may be taken out of the furnace and allowed to cool in air.

A microscopic examination of the steel in this condition will show that the elongated grains and the laminations have entirely disappeared and in their place is a uniformly large and cellular grain. Let it be understood that the transformation of the elongated grains and the laminated structure

## MANY PLANTS ARE IDLE

### Serious Labor Disturbances in the Pacific Northwest

SEATTLE, July 24.—Manufacturing industries and shipbuilding in the Pacific Northwest, particularly the Puget Sound section, are being seriously hampered by strikes and labor troubles of every kind. The street car system of the city has been completely paralyzed for the last week.

A deadlock has been reached in the state-wide lumber and shingle mill strike, both sides expressing confidence of victory and belittling the advances made by the other. It is understood that more than 20,000 workers are out on strike, with hundreds of mills closed down. The demand is for the 8-hour day, with 10-hour pay. The situation threatens to become a serious one, as upon the operation of the camps and sawmills throughout the State depends the activities at the shipbuilding plants which are building wooden ships for the Government. The State Council of Defense is making strenuous efforts to bring employers and striking employees together for a conciliatory conference, but to date has been unsuccessful. A continuance of the strike for any length of time will mean that practically every wooden shipbuilding plant in the Puget Sound country will be forced to close. More than \$90,000,000 worth of wooden ships has been contracted for by shipbuilders in the States of Oregon and Washington, to be built for the Government. Six of the largest



The Photomicrograph at the Left Shows the Structure of a Steel Rail as Rolled, Revealing the Elongated Grains. The center photomicrograph represents the same steel annealed at 710 deg. C. The third photomicrograph shows the same rail equalized at 900 deg. C. and then annealed at 710 deg. C. The composition of this steel was 0.0514 per cent carbon, 0.68 per cent manganese, 0.042 per cent sulphur and 0.017 per cent phosphorus. The photomicrographs are all 50 diameters

into that of the large cellular grain has left the steel in a decidedly weak condition. We have equalized the structure and the steel is now in good condition to respond to a simple annealing in order to refine the grain structure.

The temperature for a simple annealing is based on the critical point of the steel and in no case should the annealing temperature exceed the critical point by more than 25 deg. C. In annealing to refine the structure and to eliminate the strains it is best to allow the steel to cool down very slowly and undisturbed in the furnace.

A microscopic examination of the steel after equalizing the grain structure and subsequently refining the same shows that the structure is uniformly small and that the pearlite grain is of the lamellar variety. Also the microconstituents have approximately the same arrangement transversely as longitudinally. The steel is in good physical condition, having increased the maximum strength, the elastic limit, the percentage of elongation and the reduction of area.

As illustrating the foregoing statements, photomicrographs are offered, representing structures at various stages of treatment at a magnification of 50 diameters, of a section of plates,  $\frac{1}{4}$  in. thick by 18 in. wide, of varying composition.

lumber plants in the city of Seattle have been forced to close or operate with greatly diminished forces. Included in the above were several plants that cut only ship timber.

To add to the present serious situation is a threatened strike of union men of the metal trades on Aug. 1, which will result in complete and immediate close-down of shipbuilding plants in Seattle. The metal trades workers refuse to handle materials from the Washington Iron Works, Seattle, which operates on an open shop basis. The iron works produces materials that are essential to the shipbuilding industry in the city, and a boycott would mean serious delays at the plants. A federal commissioner of conciliation is endeavoring to bring about a settlement, but workers assert the strike cannot be avoided. Their blanket agreement with the shipyards expires on that date, and a strike seems certain. More than 15,000 workers would be affected.

The Cleveland Wire Cloth & Mfg. Co., Cleveland, is enlarging its plant by the erection of a two-story brick and steel addition, 44 x 100 ft., to be used as a weaving room and warehouse.

The Philadelphia & Reading Railroad Co. has placed an 11-hour day in force in its Schuylkill Haven, Pa., shops.

## WATER SOFTENER PLANT

### Republic Iron & Steel Co. Installing Complete System at Youngstown

The Republic Iron & Steel Co., Youngstown, Ohio, is installing a complete water softening and purifying system, the design and equipment for which is being furnished by the Wm. B. Scaife & Sons Co., Pittsburgh. The system covers a ground area 80 ft. wide by 260 ft. long. The capacity of the apparatus is 300,000 gallons of water per hour, or sufficient for boiler feed for 75,000 boiler horsepower, on the basis of 4 gallons per horsepower per hour. The system is so arranged that a further increase in capacity can be made, if required. It consists of 8 reaction and settling tank units, built of steel; 8 filter units, built of concrete, and 6 reagent mixing tanks, built of steel. The reaction and settling tank units are equipped with mechanically operated stirring devices, driven by independent motor units for each tank. Each tank is equipped with electrically-operated high-water bell alarms, and with a recording gage which registers the operating cycle of the tank. Each tank is also equipped with two pipe connections, through one of which the raw water is introduced, and out of which the precipitated sludge is drawn from the tank. The other pipe connection delivers the chemically-treated and settled water which is drawn from the tank by means of a hinged floating outlet pipe; so that in emptying the tank the water from the top is first drawn off, the floating pipe falling with the water level as the tank is emptied. These pipe connections to the tanks are equipped with hydraulically-operated gate valves, which are operated from an independent water pressure system with automatic control. The Petroleum Iron Works Co., Sharon, Pa., is furnishing the tankage for this plant, which consists of eight 37-ft. diameter by 35-ft. high tanks. A concrete and steel house will contain the filter units and pumping equipment for supplying water to the system, and for distribution of the softened and purified water, and a large concrete basin under the filters will receive the softened and purified water, from which it will flow to the service pumps. In the pump and filter house, all of the alarm bells, switches, recording gages and operating dials for hydraulic valves will be located. These will be placed on a white marble operating board, and from this operating board all of the mechanical operations will be carried out. The filter and pump house is a two-story structure, the second floor of which is to be used for the storage of chemical reagents. All handling and weighing of reagents is to be done on this floor. The reagent mixing tanks will occupy a separate room, and each tank will have a hopper, and from the chemical storage room the reagents will be delivered through hopper and spout to each mixing tank. The introduction of reagents from the mixing tanks into the reaction and settling tanks will be accomplished by means of 3 motor-driven centrifugal pumps with suction and discharge connections cross-connected, so that reagent mixtures from any tank or any pump can be delivered into any of the reaction and settling tanks. The filter units are of the gravity type, equipped with manifold special brass strainer, and brass pipe air wash system, which includes a pressure air blower direct-connected to an electric motor. All of the electrical equipment is direct-drive, and the installation represents in all details the best modern practice. The water supply is to be obtained from the Mahoning River.

Other installations of the we-fu-go intermittent water softening and purifying systems being made by the Wm. B. Scaife & Sons Co. include the following:

Phillips Sheet & Tin Plate Co., Weirton, W. Va. Capacity—40,000 gal. per hour.  
Michigan Alkali Co., Wyandotte, Mich. Capacity—50,000 gal. per hour.  
Wheeling Steel & Iron Co., Benwood, W. Va. Capacity—36,000 gal. per hour.  
Wheeling Steel & Iron Co., Yorkville, Ohio. Capacity—24,000 gal. per hour.  
Empire District Electric Co., Riverton, Kan. Capacity—60,000 gal. per hour.  
Utah Power & Light Co., Salt Lake City, Utah. Capacity—51,000 gal. per hour.  
American Sheet & Tin Plate Co., Farrell, Pa. Capacity—28,000 gal. per hour.

United Furnace Co., Canton, Ohio. Capacity—60,000 gal. per hour.  
Jones & Laughlin Steel Co., Soho Works, Pittsburgh. Capacity—80,000 gal. per hour.  
Duquesne Light Co., Pittsburgh. Capacity—30,000 gal. per hour.

These installations of intermittent water softening and purifying apparatus of large capacities resulted from the great demand for power and the necessity laid upon power producers of obtaining from their boiler equipment the highest possible efficiency.

### Report on British Iron Ores

At the instance of the Advisory Council for Scientific and Industrial Research a report on the resources and production of the iron ores and other principal metaliferous ores used in the iron and steel industry of the United Kingdom has been prepared by G. C. Lloyd, secretary of the Iron and Steel Institute. The report collects from many scattered sources and presents in a summarized form the main facts concerning the known resources of iron and other ores required in iron and steel manufacture, indicating their composition and character, and giving as many analyses as possible of the minerals in every locality, with information as to their geographical position and accessibility. The first part describes the iron ore deposits of the United Kingdom and British dominions overseas, and the second part contains similar information as regards other countries of Europe, Africa, Asia and North and South America. The third part deals with the occurrence and composition of ores other than iron used in the iron industry, such as chromium, cobalt, nickel, manganese, molybdenum, titanium, tungsten, vanadium and zirconium, with references to the composition of the ferroalloys made from some of these metals.

### Awarded Contract and Will Build Yard

The Kelly-Atkinson Construction Co., 189 West Madison Street, Chicago, erector of iron and steel structures, including bridges, has been awarded a Government contract for 20 cargo steamers to cost about \$9,000,000. The company will build a shipyard at some point on the Atlantic seaboard, and assemble the parts, which will be fabricated at various plants. The company is not yet prepared to state its plans in detail.

The Falls Rivet Co., Kent, Ohio, has purchased the plant and business of the Kent Machine Co., Kent, and has reorganized the latter with the following officers: M. G. Garrison, president; W. S. Kent, vice-president; Roy H. Smith, treasurer; Myles E. Ewing, secretary. The business of the Kent Machine Co. will be operated separately from the Falls Rivet Co. Extensions and improvements are being made in the foundry and machine shop of the Kent company.

The Traylor Engineering & Mfg. Co., Allentown, Pa., has everything in readiness for the building of marine engines and boilers to furnish the power to the 10 wooden ships being built by the Traylor Shipbuilding Co. at Cornwells. The keel of the first boat will be laid within a month and it is to be launched not later than Feb. 1. The engines will be 1400 hp. and will give the vessels a speed of 12 knots and upward an hour.

The Columbian Hardware Co., Cleveland, is distributing a very handsomely printed page entitled, "American Fundamentals," containing extracts from the Declaration of Independence, President Washington's Farewell Address, President Lincoln's Gettysburg Address and President Wilson's War Message.

Henry K. Lackland and James K. Payne, composing the firm of the Lackland-Payne Refractories Co., have opened an office at 1603 Boatmen's Bank Building, Broadway and Oliver Street, St. Louis.

The Belfont Iron Co., Ironton, Ohio, is installing a new Curtis turbo-blower, which is the first installation of its kind at any of the furnaces in the Hanging Rock district.



## A New Form of Optical Pyrometer

The Leeds & Northrup Co., Philadelphia, has developed an optical pyrometer for works use in which the luminous radiation from a heated body is balanced against that from a standardized light source. The instrument is designed for measuring temperatures from approximately 1100 deg. Fahr. to the highest known, a screen being employed to reduce the light from bodies having temperatures in excess of 2500 deg. The instrument is portable, weighing but a few ounces and can be sighted, it is emphasized, as easily as an opera glass. The case containing the storage battery, rheostat and milliammeter, employed in connection with the pyrometer, weighs approximately 10 lb., and is designed to be slung around the neck of the operator.

In use, the pyrometer is sighted at the body, the temperature of which it is desired to measure, and light rays from the body pass through a lens in the pyrometer tube and are brought to a focus at a point where a tungsten lamp filament is located. This filament, which is made incandescent by current from a storage battery, contained in a case slung about the observer's neck, appears to lie upon the image of the hot body just as the cross hairs in a surveyor's telescope appear upon the distant object looked at. The current through the lamp is adjusted by a rheostat in the battery case until the filament blends with the background formed by the hot object. At this time the observer notes the reading of the milliammeter, which can be provided with a special scale to read in degrees of temperature or the temperature corresponding to the current may be read from a calibration curve supplied with the instrument.

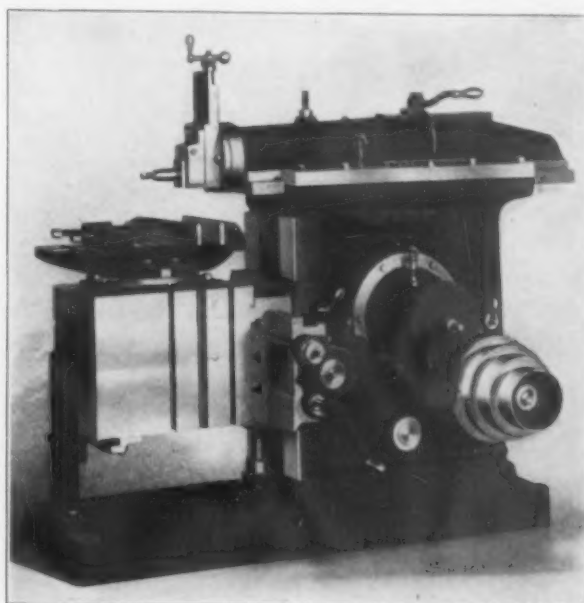
As the light emitted by both the hot body and the filament would become dazzling at high temperatures, thus increasing the difficulty of comparison, a red glass is placed in the eye piece with a view to reducing the amount of light. This arrangement, it is pointed out, possesses the further advantage that light of only one color reaches the eye and the process becomes one of matching brightness of light rather than color. The brightness of the image of the hot body, it is pointed out, is nearly constant irrespective of the distance from the body, although the size of the image of course varies.

In observing bodies having temperatures ranging from 2500 to 10,000 deg., the light even through the red glass of the eye piece would be too great for direct observation, and a screen placed between the lens and the image is provided to reduce the light from the hot body, but not that from the filament. This screen can

be thrown into or out of the field of vision by a milled disk projecting through an opening in the tube of the instrument.

## A Flush Column Type Shaping Machine

The Columbia Machine Tool Co., Hamilton, Ohio, has lately designed a shaping machine that is manufactured in 16-in., 20-in. and 24-in. sizes. The machine



The Absence of Column Overhang at the Front of the Machine Enables the Head to Be Set at an Angle and Still Obtain the Full Length of Stroke

is liberally proportioned, and the manufacturer claims that it differs somewhat from ordinary construction in that the column is flush in front without any overhang to interfere with setting the head at an angle. This does away with the usual projection at the top of the column, which makes it impossible to set the head at an angle and still obtain the full rated stroke of the machine. The flush column permits the head to be set at any desired angle and still obtain the maximum stroke.

Another feature worthy of notice is the V-shaped guides on which the rail travels. This is especially advantageous in connection with the power vertical feed that is provided and is also convenient in that the rail is clamped and may be readily locked or unlocked from the front or operating side of the machine.

Efficient table support is provided, which is clamped both to the base and the table and arranged so that the bearing surfaces are protected from chips. It also holds the table firmly at all times, and prevents deflection in any direction. It will also be noticed that the table is large and the working surface measures fully 20 in. in length. It is also made heavy, with considerable metal around the T-slots, so that when cuts are taken over it for truing up there is no danger of weakening the slots.

The feed mechanism consists of an adaptation of the well-known ratchet feed and is arranged so that the changes can be easily and quickly made. It is rigidly supported and the housing is made so as to cover the gears fully and protect them. Provision is also made so that the direction of the feed may be controlled as required, the location of the controlling lever also indicating the direction of the feed.

For lubrication the various shafts have ring oiling bearings, the feed gears run in oil, and the countershaft pulleys and bearings are self-oiling.

The 20-in. machine, which is the one illustrated, has a total weight of 4500 lb. when boxed.

The Davis-Bournonville Co., Jersey City, N. J., manufacturer of oxy-acetylene welding and cutting apparatus, will on Aug. 1 open a school at its plant for the instruction of purchasers of its equipment in oxy-acetylene practice.



Varying the Brightness of an Incandescent Lamp Filament Serves to Measure Temperature with a New Optical Pyrometer

# Secretary McAdoo Gives Congress a Shock

Asks for Appropriation of Five Billion Dollars in Addition to Previous Large Amounts  
—Tremendous Task Confronts Legislators

WASHINGTON, July 31.—Congress is now facing the most colossal financial task ever undertaken by any legislative body in the world, the completion of a program that includes the appropriation of not less than \$17,000,000,000 for the fiscal year ending June 30 next and the framing of revenue laws and bond authorization measures to provide this huge sum. These figures are not hastily compiled estimates, but the actual totals brought together by the Senate Committee on Appropriations as a guide to the Congressional leaders in laying out the work to be accomplished during the remainder of the special session.

The total lack of preparedness for war is largely responsible for these enormous disbursements during the first year that the United States has become involved in the conflict, and it is significant of our helpless position that before we are able to strike an effective blow in the great war, we must spend more money than any of the European nations actively engaged in military operations since August, 1914, has expended in any one year. England, which is paying 25 per cent of the cost of the war by taxation, has issued in bonds only \$15,515,000,000 during the two years and nine months ending April 30, 1917. During the same period France has put out \$10,532,000,000 in bonds, Russia \$11,896,000,000, Italy \$2,520,000,000, Germany \$13,276,000,000, Austria \$3,653,000,000 and Hungary \$1,730,000,000. It is apparent therefore, that our expenditures for the first year of our entrance into the war will equal, if they do not exceed, the bond issues of Great Britain for the first three years of the conflict.

## What the Request Shows

It is no exaggeration in terms to say that Congress has received a severe shock as the result of the presentation by the Secretary of the Treasury, during the past week, of estimates for appropriations not heretofore contemplated amounting to \$5,000,000,000, accompanied by the urgent suggestion that at least two billion of this sum be provided by new taxing projects and the remainder by additional bond issues. The great bulk of the sum asked by the Secretary of the Treasury is needed to cover estimates prepared by the Ordnance Bureau of the War Department, some of the leading items suggesting that little or no progress has heretofore been made looking to the national defense and that the great task of equipping our forces for the war and of putting the nation in shape for defensive operations has been just undertaken.

The largest and most disquieting item in the estimates submitted calls for \$2,468,613,000 for armament of fortifications. This demand comes upon Congress like lightning from a clear sky. The amount is more than has been spent upon coast and harbor fortifications in the past 20 years, and the fact is being emphasized here that the Chief of Engineers of the Army, in his annual report submitted to Congress last December, stated that our sea coast fortifications were satisfactory so far as attack from the sea was concerned and only needed protection against aerial attacks or assaults from the rear. It is well known that the Ordnance Bureau has contemplated the strengthening of the fortifications with 17-inch guns at a few points along the coast, but it has been the freely expressed opinion of ordnance experts that no advance in marine gunnery has been made that would render our coast defenses vulnerable. The expenditure of two and a half billion dollars for these defenses, however, can mean but little less than their complete rebuilding, in the opinion of the best informed members of the military committees of the two houses, and not only will the development of the plans of the Ordnance Bureau be awaited with interest but the details will

be examined into with much particularity before the appropriations are authorized.

## Armored Trucks

Another significant item in the secretary's estimates is the sum of \$170,277,000 for so-called "auto machine rifles," this item being closely followed by an estimate for \$21,750,000 for armored motor cars. It is understood, however, that the machine guns referred to will be utilized for various purposes and will be of various types, ranging from the light machine gun carried by infantry into the trenches up through the heavier models used on land for the arming of airplanes and up to the high-power rifles employed for the equipment of armored motor cars. Other important items embraced in these estimates include the following: Ordnance service, \$1,825,000; ordnance stores, ammunition, \$39,520,000; small arms target practice, \$2,000,000; ordnance stores and supplies, \$70,000,000; submarine mines, \$700,000; proving grounds, \$3,000,000; Benicia arsenal, Benicia, Cal., \$91,500; Frankford arsenal, Philadelphia, \$2,630,000; Picatinny arsenal, Dover, N. J., \$40,000; Rock Island arsenal, Rock Island, Ill., \$1,645,200; San Antonio arsenal, San Antonio, Texas, \$185,000; Springfield arsenal, Springfield, Mass., \$445,000; storage facilities at armories and arsenals, \$500,000; terminal facilities, \$25,000,000; Watertown arsenal, Watertown, Mass., \$741,500; testing machines, \$10,000; Watervliet arsenal, West Troy, N. Y., \$789,500; Ordnance depot, Panama Canal, \$59,700.

The appropriations to be made available for the Ordnance Bureau will be less restricted than ever before in the history of the Government by requirements as to the exact method of their disbursement. All idea of tying the hands of the Government officials to prevent the equipment of private plants for the manufacture of war material has been abandoned and the War Department will be free to place orders where it can and to provide as forehandedly as possible for future requirements that may run several years. Congress now realizes when it is too late than a large part of the enormous appropriations now being made could have been saved and the war probably materially shortened had the advice of ordnance experts been taken several years ago and private establishments equipped to co-operate with the Government in providing small arms, artillery, coast defense and naval rifles and the thousand and one other items which must now be supplied on the shortest possible notice and in quantities heretofore undreamed of. The suggestion has frequently been heard here of late that if, during the lean industrial years prior to 1914 when the war cloud was gathering on the horizon, a few million dollars had been invested in equipment and a few hundred million or so in reserve stocks of war material, the Government and the taxpayers would have been saved billions and the effectiveness of the American Army and Navy tremendously increased.

## Senators Are Disconcerted

No one in Congress has been more disconcerted by the presentation of Secretary McAdoo's supplemental estimates than the members of the Senate Finance Committee. Chairman Simmons and his colleagues had just ordered the war revenue bill to be reported to the Senate for a second time and a revised print had been received from the Government Printing Office when the secretary laid his figures before the committee and asked that the revenue producing capacity of the pending measure be increased by two billion dollars. The pending measure was designed to raise \$1,650,000,000, or about \$300,000,000 less than the House bill. The committee at once decided not to add the desired two billion dollars nor to make any addition approximating



that amount, but it was determined to give the bill a careful upward revision with a view to adding several hundred million dollars. Increases in income and excess profits taxes were naturally suggested and will probably be features of the measure as finally reported.

The second revision of the war revenue bill will probably delay its consideration another week or more and will make it difficult, if not impossible, to secure the passage of the measure by the Senate before the end of August notwithstanding the fact that Finance Committee leaders talk of using whip and spur and with a show of confidence predict that the bill will be disposed of in the Senate in a fortnight. The new conditions that have arisen with respect to appropriations and revenue requirements foreshadow a long wrangle in the Conference Committee and will greatly strengthen the hands of the House conferees in their efforts to secure the retention of such House rates as have been cut by the Finance Committee. No one expects to see the bill disposed of by the Conference Committee within a week or 10 days, and considerable more time may be consumed. September 15 is conservatively regarded as about the date when the new tax law will go into force. The delay will cost the Government many millions of dollars, owing to anticipatory withdrawals from warehouse of distilled spirits, tobacco and other goods subject to internal revenue tax and to a general advance speeding up of operations that will be subject to impost when the new statute becomes effective.

The Treasury balance, which approximated a billion dollars on July 1, has melted away to half that sum and the Treasury Department is now preparing to issue short-time certificates to tide the Government over until another bond issue can be floated. The date and amount of this issue cannot now be stated, but it is believed that the next flotation will take place in October or November, and that two or three billion dollars will then be issued.

The Canadian Government is preparing to make a loan in this country of about \$100,000,000 to pay for raw material purchased here for official account. Much of this is for the cruder forms of iron and steel utilized in Canada for the manufacture of war material. The Secretary of the Treasury, who has been consulted by the Canadian authorities with respect to this loan, states that in view of the fact that the balance of trade between the United States and Canada has been running strongly in favor of the United States he realizes that it is desirable for Canada to establish credits in our market to meet these adverse balances and, therefore, there will be no objection on the part of this Government to the proposed offer. He adds that inasmuch as the United States Government must keep control of the financial situation here by determining each foreign offering on its own merits and with reference to the financial conditions prevailing at the time, this acquiescence cannot be taken as covering future operations.

W. L. C.

The International Motor Truck Co., Allentown, Pa., has completed the order received from Great Britain for 150 Mack 'Bulldog' trucks. Each will have a capacity of five tons and is meant for service at the French front. All the trucks went to New York on their own wheels for shipment across the ocean. During June the plant turned out 140 trucks, but in the future will not try to exceed the usual rate of 125 a day. The Allentown trucks are said to have proven very valuable in the moving of heavy artillery.

The Engineers' Club of Philadelphia is waging a campaign to raise \$75,000 for a new clubhouse. The plan of the board of directors is to purchase property at 1315 Spruce Street, adjoining the present clubhouse, and connect the properties to make a commodious building adequate for the present membership, which numbers more than 2000.

The A. M. Byers Co., Pittsburgh, operating Mattie furnace, also puddling and skelp mills at Girard, Ohio, has organized a safety department and placed H. H. Henry in charge.

## Scrap Nickel Anodes Reclaimed by Welding

THE practice of utilizing every pound of nickel anodes for service by welding the scraps together is saving considerable money in many plating departments and establishments.

Until recent years many firms sold their worn anodes as scrap for want of a thoroughly satisfactory method of utilizing them—a source of considerable loss to platers, for their junk value is less than one-half their original cost. By welding the scraps together every pound of the costly metal is utilized for plating purposes at a trifling welding cost. The practice of welding such anodes is usually as follows:



The worn anodes, as they are withdrawn from the tanks, are turned over to some workman who does the welding. A scrap of suitable size and shape is selected as a hanger and other scraps are tacked to it by welding until the desired size and weight are secured. The tacking consists of melting the scraps, at the point of welding, by the heat of the oxy-acetylene flame, allowing them to fuse into one piece. The tacking of a joint requires but a moment as the temperature of the oxyacetylene flame, which is approximately 6300 deg. Fahr., causes the metal to fuse quickly. No flux is used. Where necessary another piece of scrap nickel is used as a filling rod.

The same flame is also used to remove the brass hooks from the scraps, the solder melting rapidly, leaving the pure anode to be welded.

Several other methods of utilizing scrap anodes have been tried in the past, but with uncertain results. The method of fastening them together by means of rivets and similar methods are seldom thoroughly dependable because of uncertain conductivity. It is impracticable for anyone but the manufacturer to re-melt and re-pour anodes because in so doing the composition is changed. A decided advantage in welding the scraps together is that the original composition is not changed and the fused joints insure conductivity equal to that of new anodes.

Another advantage is the fact that no skill or experience in the art of welding is required to weld up scrap nickel anodes—any workman of average intelligence can do the work without previous knowledge of the process. The welding apparatus required is inexpensive. The illustration shows the welding of scrap anodes by the Prest-O-Lite Process of oxyacetylene welding. Welded anodes are seen in the foreground.

The Bailly & Allen Co., 122 South Michigan Boulevard, Chicago, has been incorporated to carry on the business in structural steel and machinery formerly conducted by R. W. Bailly. The incoming member of the firm is M. E. Allen, formerly secretary and contracting engineer with the Central States Bridge Co., Indianapolis, Ind. The change went into effect Aug. 1.

The Marietta Casting Co., Marietta, Pa., has announced a voluntary advance of 5 per cent in the wages of its molders.

# Use of Producer Gas Without Regenerators

Temperature of 2100 Deg. Fahr. Obtained  
by Surface Combustion in Continuous  
Heating Furnaces at Buffalo Bolt Co.

—BY JOHN H. BARTLETT, JR.\*—

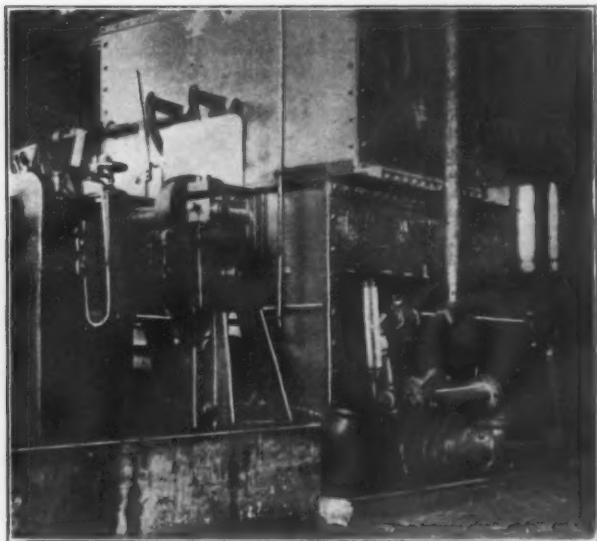
**P**RODUCER gas has recently been successfully applied without regeneration to a continuous forging operation in the plant of the Buffalo Bolt Co. at North Tonawanda, N. Y., a few miles from Buffalo. An installation of Smith bituminous up-draft producers was made at this plant about a year ago, to furnish fuel for rolling mill and forge shop furnaces, but until the recent equipment of a coil furnace with surface combustion burners, its use has been restricted to the rolling mill.

Bolts of standard sizes up to  $\frac{1}{2}$  in. that are manufactured in large quantities are forged by a group of five continuous header units of the Buffalo Bolt Co.'s own design. Each unit consists of a bolt header machine, which heads and cuts off a bolt at each revolution, and a coil furnace from which stock is fed continuously to the machine. This method of making bolts was invented and developed by W. B. Peirce, general superintendent Buffalo Bolt Co., with a view to rapid and economic production, and each unit is capable of forging about 85,000 bolts per 9-hr. day.

The iron is fed to the furnace in the form of wire coils of about 30 in. diameter by a revolving drum device, which forms the back of the furnace and is driven by an electric motor. Inside the furnace the coils hang over a water-cooled arm and one by one are pulled off, straightening as they are drawn out through a small opening in the front of the furnace by the machine feed. The process is made continuous by electrically welding together the ends of the coils before they are fed into the furnace. By this means a considerable amount of wire is always in the furnace, allowing ample time for the metal to come to a uniform heat. The furnace is approximately 5 ft. long by 5 ft. high by 4 ft. wide, inside dimensions, and, with the largest size stock the metal is forged at a temperature of 1800 to 1900 deg. Fahr.

Previous attempts to fire these furnaces with producer gas proved unsuccessful in obtaining a satisfactory temperature, although checker brick regenerators were installed. Oil fuel has heretofore been used which, however, is more expensive than the gas

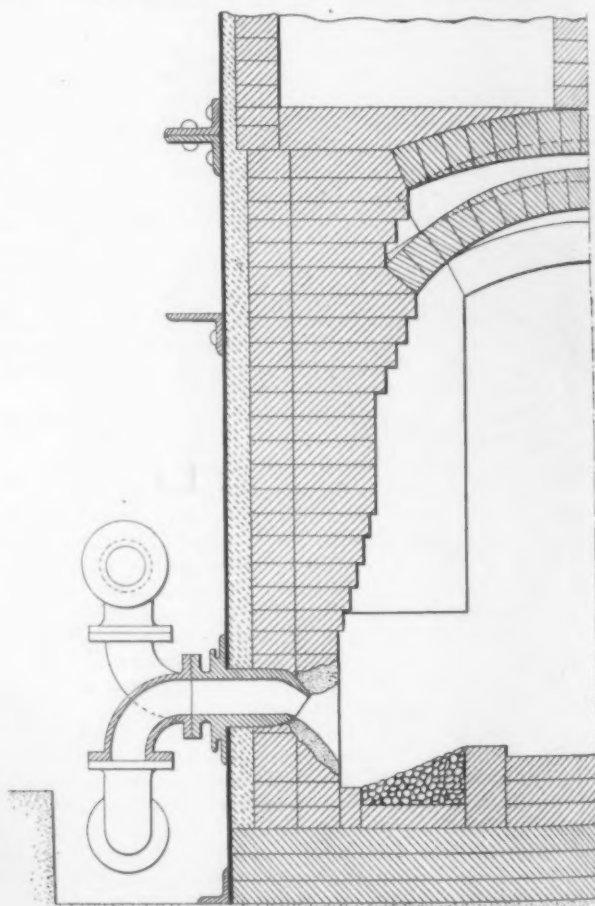
\*The author is engineer, Surface Combustion Co., Long Island City, N. Y.



Adjoining the Bolt Heading Machine Is the Heating Furnace. The Venturi tubes with air inlets through which the gas passes before reaching the burners insure proper proportioning of air and gas

and at high temperatures produces an objectionable scaling of the iron.

One of these furnaces has now been equipped with four gas burners of special design by the Surface Combustion Co. of Long Island City, N. Y. Each of these burners is provided with a proportioning inspirator which utilizes the pressure of 8 oz. at which the gas is supplied from the main to entrain the necessary air for combustion. This mixture of air and gas, passing through the air-cooled burner castings, is baffled and burned in a refractory bed of broken carborundum, which insures proper combustion and radiates heat to the walls and arch of the furnace. A cross-sectional sketch of the furnace construction and details of the inspirators and burners are shown in the illustrations. Gas is supplied by control cocks to nozzles in the in-



Producer Gas Properly Mixed with Air Is Directed Against Incandescent Carborundum Insuring Complete Combustion

spirator bodies. Air admitted through the inlets at the Venturi tubes is entrained by the gas through the Venturi throats, in which the air and gas are thoroughly mixed before passing to the burners. Flanges are provided for air-cooling the burners.

The gas consumption and furnace temperature are controlled by control cocks, the air entrained being at all times proportional to the amount of gas supplied. The shutters or dampers, shown on the air intakes, are provided to accommodate variations in the gas quality and, when lean gas requiring less air for combustion is supplied, they are partly closed. The water gages, showing the pressure to which the gas is throttled, afford an index of the consumption of each



burner. When it has been determined, through operation, that a certain pressure is sufficient to maintain the heat when working on a certain size of wire, this burner capacity can always be quickly duplicated from the pressure gage reading without guessing at the proper setting for the control cocks.

To keep scale on the metal at a minimum, the burners are arranged to operate with a slight excess of gas and, when running the furnace at high temperature with this rich mixture, the oxidation has been found to be considerably less than the best results obtained with the oil furnaces. The metal also appears to be somewhat softer, probably due to a more thorough heating through, and is easier to work.

No exact comparison of operating costs with oil and gas can be made, as accurate data on the amount of oil consumed and the cost of the gas are lacking, but a rough estimate was made as follows:

Average oil consumption, 20 gal. per hr., at 5c. = .....\$1.00  
Average gas consumption, 20,000 cu. ft. per hr., at 3c. = 0.60



Large Revolving Drums at the Rear of the Heating Furnaces Feed in the Wire from Which Bolts Are Forged

The calorific power of the gas fluctuates somewhat, but averages about 150 B.t.u. per cubic foot.

The machines are operated 9 hr. per day, and the furnaces are started about an hour and a half before work is commenced. Sufficient burner capacity is provided to bring them up to 2100 deg. Fahr. in this time.

It is believed that a substantial economy can be effected over the present operation by recuperation and plans are under consideration for preheating both the air and gas in steel chambers placed above the present flue outlets in the casing formerly used for the checker work regenerators.

Duplicate equipment for two more coil furnaces has been ordered and other producer gas burners are at present being made by the Surface Combustion Co. to equip a large vertical annealing furnace for the Buffalo Bolt Co. This will have eight burners located to give a uniform heat to all parts of the furnace, each two burners having an inspirator similar to those used on the coil furnaces. Where it is desirable to use smaller burners a single inspirator may be used to supply a number of these through manifold piping. As a device for correctly proportioning and mixing air and gas the inspirator is simple and reliable, and has no moving parts that can be damaged by back fires or choked by tar and mixture carried in the gas.

Producer gas burners are also being designed for use in a tong-header furnace, to replace one of the present coal-fired forges. This operation consists in



Inside the Furnace the Entering Wire Is Drawn from a Water-cooled Arm on Which It Hangs in Coils

heating the ends of small rods for heading in a hand-fed machine, and is used for bolts of sizes other than those handled profitably in the coil machines. In this forge the ends of the bars will rest upon the top of the refractory material in which combustion of the mixture of air and gas takes place, and they will thus be close to the source of heat, duplicating the conditions in the coal forge. The furnace will be fired by six burners equally spaced along the rear, and connected alternately through two manifolds to inspirators as on the annealing furnace.

#### Benzol and Toluol Markets

Large quantities of benzol are piling up in storage warehouses awaiting shipment to Europe, the scarcity of bottoms making it impossible to ship consignments which heretofore have been going on regular monthly specifications. The same situation holds true with regard to phenol and picric acid, and there is no relief in sight. Producers of benzol are sold for many months ahead on contract, and prices remain firm on the basis of 55c. to 60c. per gallon for the pure.

The United States Government is taking practically the entire toluol output of the by-product ovens, and this product is being shipped as rapidly as present conditions will permit to plants where it is made into trinitrotoluol. This Government is supplying the needs of its Allies for trinitrotoluol. The price to the Government is \$1.50, but on private contracts and in re-sale lots for spot shipment it brings from \$1.75 to \$2 per gallon.

The sulphate of ammonia market is firm, fertilizer manufacturers having contracted for many months ahead.

Orders for airplane motors, taken recently by the Willys-Overland Co., Toledo, Ohio, include 4500 motors for the United States, 4500 for Canada, and 1000 for England. Work on these motors will be distributed among the various plant departments. Some plant extensions are contemplated for work in the airplane department.

Singer, Reel & Taylor have opened offices at 304 Wabash Building, Pittsburgh, and will engage in the sale of iron and steel, alloys, coke and scrap. It will act as sales agent for the Acme Steel Co., Pittsburgh, which plans to erect a new plant at Glassmere, Pa.

The City of Kingston, Ont., is granting permission to the Kingston Shipbuilding Co., to extend its plant 75 feet further into the harbor. The company requested this concession on account of the big increase in shipbuilding operations.

A. A. Heilman, a Reading architect, is making plans for extensive improvements at the plant of the Light Cycle Company, Pottstown, Pa., which manufactures castings of various kinds and automobile parts.

# Refractories in the Steel Industry\*

Necessity for Scientific Research—How It  
May Best Be Directed—Important Points  
to Be Studied—German Achievements

—BY COSMO JOHNS—

**W**RITERS so rarely state exactly what they mean by refractory materials that a definition may not be out of place even though its terms may not find general acceptance. As the metallurgical processes employed in the iron and steel industry involve heat exchanges, and high temperatures are necessary for most of the reactions that occur, special materials are required for the construction of the portions of the furnaces, ovens, and vessels employed that are exposed to high temperatures and are in contact with the solid liquid and gaseous substances taking part in the reactions. These special materials are refractory if they are capable of fulfilling the structural duties required while subjected to the high temperature necessary for the process employed, and are themselves unaltered during its progress.

The conditions that prevail when metallurgical processes are being carried out vary so much, and the problems presented by the occurrence of slags sometimes basic and sometimes acid, of atmospheres now reducing and again oxidizing, call for so many mutually exclusive properties in the refractory material employed, that only an infusible and non-volatile substance, with no volume change during variations of temperature, inert from a chemical standpoint, and with sufficient structural strength yet a non-conductor of heat, would be considered ideal. No such substance is known and very probably does not exist. Hence any refractory materials employed in the metallurgical art will be the nearest approach available to the ideal for the particular process employed. And as metallurgical processes are in practice conducted on commercial lines, the refractory material employed will be that which enables a given unit of final product to be produced at the lowest cost.

## Available Materials

With the exception of carbon, and its compounds with silicon, which have a limited application, the available refractory substances are chiefly the oxides  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{CaO}$ ,  $\text{MgO}$ ,  $\text{Cr}_2\text{O}_3$ , or mixtures of these with oxides of iron,  $\text{K}_2\text{O}$ ,  $\text{Na}_2\text{O}$ , and traces of other substances, regarded as impurities, some of which may function as catalysts. The materials available are therefore strictly limited; they never occur in a state of purity in nature.

The final product, as delivered to the user, is always a mineral aggregate, often of great complexity. They possess no fusion point, but rather a range during which softening, at first incipient, at last, with increasing temperature, causes the material to fail to perform its functions. The constituents have varying melting points, and during heating they invert and new phases appear. Some inversions, involving serious volume changes, should be completed during manufacture, but often are not. This is not imputing blame to the manufacturer, for the temperatures required for such changes are rarely known, and even when known as a result of experiments under laboratory conditions, it does not follow that they apply to manufacturing processes.

The art has been so long in front of the science of the refractory industry that the most urgent need at present is for an expression, in terms of scientific precision, of the most successful practice in manufacturing the refractory product and of the physico-chemical changes which take place when they are used.

## Tenacity and Compressive Strength

Tenacity and compressive strength at ordinary temperatures are valuable only in so far as they permit

the refractory products to be transported and enable them to withstand the structural stresses to which they are exposed when used. This is not difficult to attain. It is when the material is exposed to high temperatures that the value of these properties becomes most important. The abrasion caused by the movement of solid substances while in contact with their heated surfaces is important, while the erosion caused by the passage of dust-laden gases at high velocities becomes serious in time. Little or nothing is known of the conditions that favor or retard abrasion and erosion.

Compressive strength is rarely a cause of failure, for the bulk of the refractory material is at a lower temperature than the face and therefore less affected. There is, however, urgent need for accurate determination of these two properties at wide ranges of temperature for the more important materials under both oxidizing and reducing conditions.

## Corrosion and Volume Changes

Not less important than resistance to high temperature with concurrent abrasion and erosion is resistance to the corrosion caused by slags or gases. The effect of acid slags on basic refractories and of basic slags on acid refractories is familiar, while a most striking example might be indicated on the marked corrosion of the silica bricks in the gas ports and uptakes in open-hearth furnaces, due to the alternating passage of oxidizing and reducing gases with the resulting formation of fusible silicates.

A factor conducive to rapid corrosion in the last case is the absence of large particles of silica in the bricks employed and the presence of excessive pore spaces. Here again little has been published and few observations recorded. The effect of the alkalis found in certain coals on the refractories used in coke-oven construction is serious, and here too little is known as to the real nature of the destructive influences at work.

Every element or compound used as a refractory undergoes changes in volume during heating and cooling. In the case of coke-ovens the retention of gas-tight partitions is absolutely necessary, and this involves the use of a refractory material which does not undergo appreciable volume changes. This apparent contradiction of the first statement simply means that a mixture of substances with volume changes of opposite sign are employed, viz., clay and silica. But while the contraction of the burnt clay is fairly regular with increased temperatures, quartz, which is the form of silica found associated with it in nature, has an inversion point at which it becomes tridymite. In the presence of certain compounds this inversion takes place at a temperature lower than that at which coking is carried on. In their absence the inversion is retarded and does not take place until a temperature higher than that usual in coking practice is attained.

## Heat Conductivity, Texture and Porosity

If the refractory materials used possess a fusion point or softening range higher than the maximum temperature to which they are exposed, it would in most instances be desirable that they should be non-conductors of heat, for radiation losses would then be at a minimum. More often the prevailing temperatures approach and sometimes exceed that at which fusion or softening occurs. In those cases it is necessary to encourage radiation from the surface farthest removed from the heated surface, in order to cause a steep temperature gradient from the heated to the cooler face. Good conductivity for heat is most desirable where the material is used to form walls which transmit heat from the burning fuel to the contained charge

\*From a paper presented before the Iron and Steel Institute, London, May 3, 1917.



which is being heated. The melting of steel in crucibles and the coking of coal are instances where a refractory material with good heat conductivity is required.

These physical characteristics of refractory materials determine in large measure their suitability or otherwise for particular duties. Owing to the complex nature of most of the materials used in practice their properties are not those of the simple minerals of which they are composed, but the resultant of variations which are sometimes of opposite sign and are always varying at different rates. The relative size of the grains employed, the extent of the surface exposed by the more resistant constituents to the others used as bond or matrix, are most important factors in contributing to the ability of the material to perform useful service. Another point of some importance is the influence of mass in promoting or retaining inversions. Some of these inversions take place almost instantly once the critical temperature has been reached, but with others marked hysteresis occurs.

Porosity must always occur when the refractory material is composed of more than one constituent, and where their chief volume changes are dissimilar or occur at different temperatures. Little is known of the effect of porosity on the properties of refractory materials. That the pores encourage the deposition of extraneous substances in the interior of the bricks, and that they render the structure permeable to gases, is of course obvious.

#### Stresses Caused by Temperature Changes

The stresses caused by temperature changes are due to the volume changes which take place during heating. If the refractory material happens to be a good conductor of heat these are not serious, unless one face is rapidly heated and the distortion produced exceeds the tenacity of the material. The remedy available is to avoid rapid temperature changes, and whenever possible to raise the temperature of the material during the burning stage of manufacture well above that at which the inversion to which the principal volume change should take place, and to hold it at that temperature long enough for the inversion to be completed. The "spalling" of magnesite bricks which sometimes occurs has been thus explained, and it is certain that the excessive expansion of silica bricks would be avoided if the manufacturer could insure the completion of the quartz-trysidite inversion during burning. Despite the considerable advances in our knowledge of the inversions of silica made recently, their bearing on the problems that face the manufacturer are not yet sufficiently clear.

#### Need for Further Research

Advances in the art of metallurgy are largely conditioned by the nature of the refractory materials available. The manufacture of these materials is based almost entirely on empirical rules and the experience of the men employed. Such rules are the result of experiences gained during a century or more by a rude process of trial and error, but where means of correlation were very inadequate. The methods employed to-day represent the survival of the fittest by the searching test of commercial success, but it by no means follows that they represent the best attainable. Further progress, if made at all, can only be slow and uncertain, and by consent it is now admitted that only by adequate and well-directed scientific research can such progress be accelerated.

The first step—and in all probability the one easiest to take—would be to prepare specifications for the most important refractory products expressed in terms capable of precise measurement or description, basing the specification on the best current practice. But specifications at their best only serve to stereotype the best current practice of their day. These specifications should be the starting point of systematic research which should cover, not only the problems that occur during manufacture, but the occurrence in nature and characteristics of the raw materials. Their concentration and purification, proximate and ultimate analysis,

mineralogical description and thermal analysis are all points on which additions to our present knowledge would be of great value. But the refractory materials are so complex, and the problems involved are so difficult of direct attack, that any contributions to our knowledge of the properties of the pure minerals, or of the impure aggregates which are used in practice, would be welcomed even if their immediate application did not happen to be possible.

#### Discussion

The author said that his paper was the result of a conference following a meeting of the Faraday Society last autumn. He represented the Institute at that conference, and had been asked to prepare the schedule, embodied in the paper, of the requirements of the iron and steel industry. He now wished to share the responsibility with the members, and invited their criticism. In reading an abstract from his paper the author observed that there was a big future before dolomite bricks if some scientific worker could discover a suitable means of using native deposits of dolomite in a satisfactory way for making bricks. The scientific study of bricks, and especially silica bricks, was extremely complex. For example, the wearing of nozzle and runner bricks was not a simple problem, to be solved by the general use of magnesite. It was largely a matter of the composition and temperature of the steel.

Sir Robert Hadfield said the paper was of unusual value. Not so long ago some makers of refractory materials did not even take the trouble to have analyses made of their product, but analyses were quite as essential as in the case of steel. Many makers, also, had no means of determining the temperatures at which they burned the bricks. All the makers of refractory materials in the kingdom should buy pyrometers.

#### German and American Research

Prof. W. A. Bone said that everybody felt that enough research had not been done on refractory materials in the past in this country. He referred to the work of German and American investigators, and mentioned that an investigation on coke-oven linings and firebricks was being made at the Imperial College by his colleague, W. C. Hancock and himself. He made an eloquent plea for organized research on a wholesale scale throughout the country, with financial support from the industry which would benefit thereby, and asked that in forming research committees the men who were actually doing the work should not be left out.

Professor Arnold stated his own experience 11 years ago in trying to stimulate interest in refractory research. When putting down the experimental open-hearth furnace at Sheffield University, he lined part of it with German bricks, which after 11 heats stood out two inches above the British bricks. He endeavored to interest the local brickmakers, but they declined to have anything to do with bricks containing only 92 per cent of silica. He was attacked in the local papers as unpatriotic. He used German bricks in his furnaces for nearly two years, and then two British makers challenged the German bricks. On testing the British bricks against the German, all came out equal. Composition alone was not enough as a guide to the value of refractory materials, correct grading and fine texture being of great importance. He thought it was necessary to separate research from teaching, and said Sheffield University was not asleep, referring to a big scheme for research to which Hadfields (Ltd.) had given £2000.

#### Poor Clays Made Better by Germans

H. M. Ridge said that in his experience British clays were not inferior to those on the Continent, but were not used to the best advantage. The Germans were very skilful in making inferior clays available and in eliminating alkalies. The clay from Griesen, in Austria, for example, was in the ordinary way not sufficiently plastic or refractory, but by adding about 10 to 15 per cent of ordinary fireclay the properties improved most remarkably, and the product was exten-

sively used for coke ovens and retorts. Bohemian kaolin was also extensively used for improving the quality of German firebricks, and it would stand up to Segar cone No. 36. The Germans had experimented largely on the correct amount and size of particles of the burnt fireclay or "grog" to add to the raw clay in making bricks. He had found some difficulty in obtaining from British makers continuous supplies of properly burnt firebricks, and complained that there was no place in this country, comparable to the plant at Charlottenburg, where he could send a firebrick for scientific testing. He also referred to the careless way in which firebricks were exposed to the weather in open trucks in sidings and by being stacked in the open air at the works.

### Press for Straightening Crankshafts

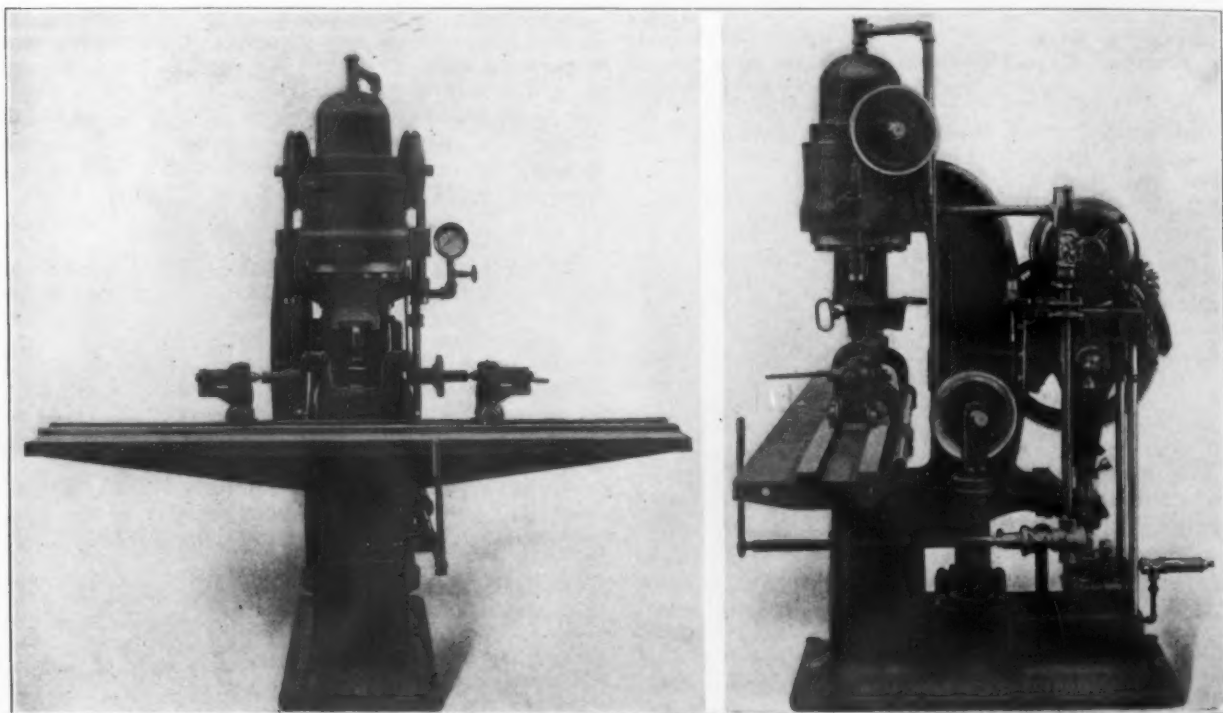
The Metalwood Co., Detroit, has developed a line of presses for straightening crankshafts. Two sizes, 20 and 35 tons, are built. Either belt or motor drive is provided for the pump or the pressure can be supplied from an accumulator.

The table upon which the work is placed is of heavy box section reinforced by ribbing and is made of semi-steel. Renewable steel strips on which centers for holding the work are placed and which also take the

### Railroads Disagree

*Baltimore*, the official publication of the Merchants' and Manufacturers' Association, Baltimore, Md., publishes the following:

For a number of years the manufacturers of iron and steel articles in Baltimore have enjoyed the benefits of a privilege offered by the carriers, notably the Baltimore & Ohio Railroad, known as the fabrication in transit of bridge and structural iron and steel. This material, under this arrangement, is brought into Baltimore from the mills in Pennsylvania, Ohio and West Virginia in the raw state and holes are punched, rivets and bolts inserted and the raw material is otherwise worked into shape for the buildings and bridges for which it is ultimately intended and then shipped out at the same rate that would have applied had the material gone to the destination direct from the mill, plus a charge of one (1) cent per 100 lb. for the stop-off privilege. Our members have created a substantial business thereby and are enabled to compete successfully with plants in other sections favored, under other circumstances, by the rate adjustment. The Southern Railway Co. has been a party to these tariffs since their inception, but due to a disagreement between them the Baltimore & Ohio Railroad as to the proper division of the rate, the Southern Railway has canceled its participation in the arrangement and the Baltimore & Ohio has issued tariffs eliminating the Southern Railway, effective June 16, 1917. As this elimination works a hardship upon our members, the Traffic Bureau Committee, upon complaint, considered the matter, having representatives of the manufac-



Special Motor-Driven Press for Straightening Crankshafts

thrust of the ram when pressure is applied to the work are provided. The centers are of the yielding type and are adjustable for length, and the thrust of the work is taken by tapered steel wedges placed underneath on steel tracks. Both the top and sides of the table are finished so that indicators may be used.

The sub-base upon which the pump is mounted forms a tank for liquor. The pump, which is of the two-plunger type, is built directly into the press. The body is of special bronze, with large valve areas, and the plungers are of hardened and ground tool steel. Phosphor bronze bearings are used throughout. The press is controlled by the builder's single lever, quick operating valve which gives control of the speed of the ram, its return and the amount of pressure applied. The ram nose is fitted with sliding chrome-nickel steel resistance block with two steps for crank work, this arrangement being relied upon to conserve the stroke of the ram and the use of liquor, as well as increasing the speed of the press. A heavy spring arranged for differential pull with adjustable tension provides for the return of the ram.

turers present, and voted to ask the Interstate Commerce Commission to suspend the tariffs and also ask the President as an emergency measure under Section 5 of the by-laws to obtain the consent of five members of the Executive Committee so that immediate action could be taken. This was done and an application for suspension has been filed under the rules of the Commission asking for the suspension of Baltimore & Ohio Railroad Interstate Commerce Commission Nos. 15055 and 15057. The Baltimore & Ohio Railroad is simply named a party to complete the record.

At a recent meeting of the stockholders of the Hamilton Machine Tool Co., Hamilton, Ohio, the following officers were elected: President, Charles F. Hilker; vice-president, M. L. Milligan, and secretary and treasurer, John K. Hilker. The board of directors consists of Charles F. Hilker, M. L. Milligan, John K. Hilker, H. Belmer and O. W. Kuhn.

The 500 striking polishers at the Remington plant, Bridgeport, Conn., have voted not to obey the orders of their general officers to return to work.



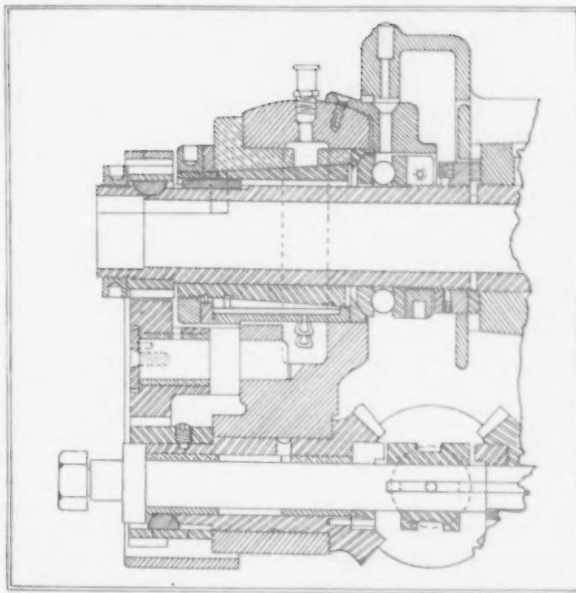
## A 12-In. Lathe for Toolroom Work

A 12-in. lathe in which the back gears are mounted in a special yoke has been brought out by the Davis Machine Tool Co., Inc., Rochester, N. Y. This arrangement for mounting the back gears and bringing them into mesh with the cone gears by a cam operated by a handle on the front of the lathe has given the tool its designation of close coupled.

The bed of the lathe is dropped down at the rear end to enable the tailstock to be slid off without disengaging the clamping bar or removing any bolts. Transverse double wall cross girts of heavy section are relied upon to enable the bed to resist strains. The headstock is a heavy one-piece casting in which the front and rear walls of the bearing extend to the center line of the spindle. This construction, it is pointed out, ties the headstock together. The cone pulley is covered by guards which are integral with the head, and a brake for stopping the rotation of the spindle is mounted in the top of the guard. The back gears are located under the headstock at the front end of the spindle, an arrangement which it is emphasized provides a drive from the cone through the gears without a long eccentric shaft and quill. These gears are mounted in a yoke which swings from a point at the back of the headstock and are thrown into mesh by a handle placed at the front of the lathe, thus making it unnecessary for the operator to reach over the cone. The small cone gear, which is usually placed at the end of the cone next to the small step, is placed at the opposite end adjacent to the large step and securely keyed in position, the cone driving plate being carried on its other face.

The spindle, which is of crucible steel, revolves in phosphor bronze bearings mounted in the headstock that are relied upon to give a rigid support for the spindle. Lubrication is provided by oil rings dipping into large pockets cored in the walls under the center of each bearing. The front bearing for the spindle is of the taper type and wear is taken up by drawing the spindle into the taper. The rear bearing is keyed to the spindle and slides on it, the adjustment being made by a collar on the end which draws the spindle into a taper bronze box. Hardened steel washers and self-aligning ball bearings are provided to take the end thrust.

The carriage has a bearing of 19¼ in. on the ways and the cross bridge is 6 in. in width. The compound rest swivel base is graduated and has four clamping bolts, a construction which is relied upon to permit heavy cuts to be taken without deflection. Wear in the cross and compound slides is taken up by taper gibs having an end screw. The apron is of the conventional double plate type, providing two bearing supports for all shafts. Longitudinal and cross feeds are controlled from the apron and both can be released while cuts are being taken. Provision is made to prevent a simultaneous engagement of the feed and the half-nut. All of the apron bearings are lubricated from a central oil



The Back Gears Are Carried in a Yoke and Are Swung into Mesh by a Cam and the Small Cone Gear Is Located at the End of the Cone Adjacent to the Large Step and Has the Cone Driving Plate on Its Other Face

pocket and the rack pinion stud can be withdrawn when the lathe is used for screw cutting. The mechanism for reversing the carriage is operated by a lever at the right end of the apron which controls a sliding clutch under the headstock that provides carriage travel in either direction through a set of bevel gears. This arrangement, it is pointed out, enables the spindle to run in the one direction and doubles the number of speeds available by driving both countershaft pulleys in the same direction. An automatic stop for the carriage is obtained through the same rod that operates the reverse mechanism, and can be employed with either the screw or the feed rod. The use of adjustable collars enables the lathe to be employed for duplicate or shoulder work.

The tailstock is of the cutaway type and permits the compound rest to be set parallel with the bed. Two ½-in. bolts are provided for locking the tailstock to the bed. The tailstock is of heavy construction and the upper part is arranged to set over for taper turning.

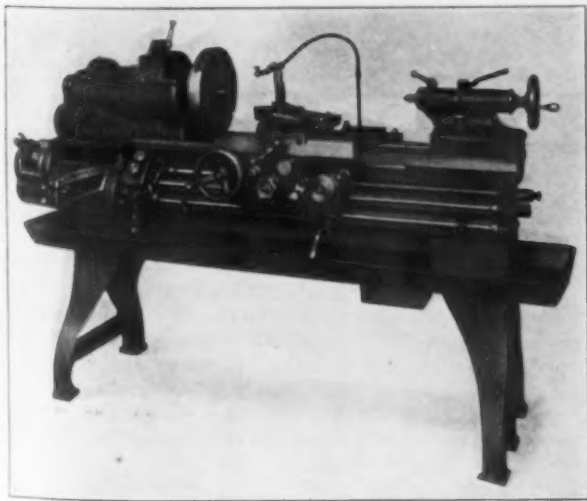
A quick-change gearbox, which is a self-contained unit, provides for 36 feed changes. The feeds are obtained without the use of the lead screw through an independent feed rod which can be locked in or out by a clutch adjacent to the gearbox. The gearbox also supplies 36 leads for threads ranging from 1½ to 80 per in. including the standard 11½ pipe thread, and others can be secured by changing gears on the quadrant at the end of the lathe. The lead screw is 1¼ in. in diameter and can be locked out when not in use.

The exports of tin from the Federated Malay States in June were 3489 tons as compared with 3413 tons in May. In June 1916 and 1915 respectively they were 3435 tons and 4048 tons. The June exports this year were the largest for the year except the 3558 tons in January. To July 1, 1917, the total exports have been 19,752 tons against 21,725 tons and 23,318 tons to July 1, 1916 and 1915 respectively.

The Bethlehem Steel Co. has placed No. 3 blast furnace at its Steelton, Pa., works in operation, following extensive improvements. The entire battery of six furnaces at the plant is now being operated.

Hamilton & Hansell, 17 Battery Place, New York, have been appointed Eastern sales agents for the Hoosier Rolling Mill Co., Terre Haute, Ind., which produces high grade refined iron.

The Bullard Machine Tool Co., Bridgeport, Conn., has announced an increase of 10 to 16 per cent in wages, affecting all employees.



A Special Arrangement for Mounting the Back Gears Characterizes a New 12-In. Lathe for Toolroom Work

# Managing Alien Workers in War Time

Human Element Must Be Given Consideration in Solving Problems Which the World War Has Brought upon Industry

—BY WINTHROP TALBOT, M. D.—

**W**ORLD-WIDE war confronts industry, and managers of industrial plants face new human problems. Man power and woman power are at a premium and seem likely to remain so. The casualties of war are largely estimated at 45,000,000, a number equal to the total population of Great Britain, and America is only just beginning to contribute her quota. The next few months will see the best manhood of the nation withdrawing from the industrial field to be drafted for active work abroad. Every industrial establishment faces readjustment of its working force. Every industrial manager is compelled by war pressure to study human conservation. Every director, every superintendent, every foreman and gangboss fails unless he turns his attention to solving employment problems and solving them intelligently along modern lines of human engineering.

Do lines of workmen seek jobs at your gate? No, for the job seeks the man. Where formerly a great metropolitan daily carried 20 columns of "Situations wanted" and but eight columns of "Help wanted," today the case is reversed, there are 20 columns of "Help wanted" to six columns of "Situations wanted." On July 15, a Sunday edition had 29 columns advertising for male help contrasted with eight columns of situations wanted by men. There were nearly 30 columns of advertisements for female help, with only five columns of situations wanted by women. Are you able to pick and choose, or hire and fire at will? Not in the basic industries. Moreover, increased demands for output are pressing as labor shortage increases.

## Problem of Labor Supply

These commonplaces are disheartening unless some solution can be found. The problem of adequate labor supply can be met, but only by leaving the well-worn ruts of old-time employing methods, and by finding better ways and wiser adjustments in the handling of men—and now of the women who are taking the place of men.

In those industries where many aliens are employed, labor shortage is especially noticeable because of the diminution of immigration since 1914. Instead of a million new toilers a year coming to our shores to seek employment, the net immigration in 1916 was less than 100,000.

Heretofore industrial management has been satisfied to treat the alien somewhat cavalierly. Aliens have been "hunkies" or "polaks" or "wops" to the average employing agent. Few concerns have taken the trouble to make records of shifting alien labor, for there were always men at the gate to be picked up for a day's work. If a man didn't suit he was discharged. The smallest living wage was given and that grudgingly. To-day there are seldom men at the gate and the demand for wage increase comes often enough and must be heeded or your working force walks out.

It has been found by many concerns already, and others are going through the painful process, that increased wages and shortened hours are not enough. To the old-time industrial autocrat the awakening has come as an unwelcome surprise, but the manager who is a student of men and times has adopted improved employment methods, in some degree at least. During the past few years, welfare plans have been abandoned in favor of more scientific methods. Industry has begun to look upon the labor problem as one demanding exact observation, intensive study, and careful thought, like any other industrial engineering problem.

## The Alien Laborer

As immigration has decreased the alien laborer has

become a source of keener interest. We are hearing more about Americanization, a handy word, which, like the mantle of charity, covers a multitude of economic sins both of omission and commission. We are gradually realizing that our labor must be less masterfully employed; that labor expense must be differentiated more clearly from labor cost; that the value of labor cannot be measured merely by the wage paid without taking into consideration the work accomplished and increment of gain, for probably all agree that never has there been a time when less return in the form of work was given for so large a wage. It may be that someone has analyzed the matter and has learned the reasons why this is so. Probably there are many reasons, and perhaps the most important may be indifference to the whole human problem in industry, not only of the manager, but especially of the non-resident director.

Scattered throughout the Eastern States are thousands of communities where immigrants since 1900 outnumber the native born. They do not speak English much, a quarter of them not at all, and an equal number cannot read or write even in their native language. We have allowed communities to be built up which are as foreign in language, habits, thought and action as villages in Russia, Poland, or Italy. This is no news. Everyone has known it for years, and familiarity seems to have steadily bred contempt, but war-increased wages, slack workmanship, and driving demand for increased production are bringing industrial management up with a round turn to study the alien residential and employment problem with more intelligence. Some of the largest employing companies are still mighty dull of apprehension and have not waked up yet in spite of several severe jolts in the recent past. Few directors have learned to think in terms of community responsibility as an element of private gain and it is difficult for such belated individuals to realize that no industrial concern to-day is strong enough laborwise to act independently of other employing concerns. For instance, such communities as Bayonne, Bridgeport, Newark and Paterson are typical of many others where numerous industries are now competitors in a labor market which is insufficient to meet war needs. In such communities, the first requirement is a get-together campaign on the part of managers to form a clearing-house for information and self-education on these new industrial and alien human problems.

## Seeking Expert Knowledge

Expert knowledge is available, but the American manager is only just beginning to learn the importance of seeking expert knowledge. The war is teaching him, for the industrial world has come to have a wholesome respect for the staying power and the ruthless vigor displayed by German industrial organization, the secret of which lies in the fact that for years Germany has followed an unswerving policy, first, of getting together, and, second, of training and employing expert knowledge in solving special problems.

If there is one thing as certain as truth, it is that American industrial organization must surpass German organization in these two respects: namely, co-operative methods and the employment of expert knowledge in every form of industrial activity, and especially on the human side. These are winning cards. American science has played them and is winning. American industry can also.

It is futile for any one industrial concern in a given locality to attempt to cope with the alien problem single-handed. It is a problem that requires co-operation



on the part of all the industrial leaders of the community. Raising wages isn't enough; shortening hours isn't enough, and the reason why higher wages and shorter hours will not suffice is that the alien problem in industry is one which concerns not so much the men as the women and children—in other words, the home of the alien; but the home is a community problem, and the community which alone can provide the solution depends for its leadership upon the managers of its industries. Professional men such as lawyers, physicians, educators and the clergy do not hold the purse-strings, nor pay the bulk of the taxes. The industries do. Therefore industrial managers must assume a constructive leadership in community matters.

#### When Conditions Are Bad

Let us analyze the subject further. Here is a community which employs thousands of aliens. There are refineries, woodworking establishments, metal trades, cloth mills, and dozens of minor factories. The city administration is largely in the hands of professional politicians. Housing conditions are bad. Air pollution is bad. Drainage and removal of waste is bad. Water supply is below standard. Food adulteration is bad. Food cost is exorbitant. Recreation facilities are meager. There are 30 races speaking 40 different languages and dialects. Is the case overstated for immigrant centers? Probably not, for the bare facts have scarcely been touched upon; they are too obvious in our industrial towns even to require stating. What is wanted is a remedy; that it is our business to supply.

The first step is for the local managers to get together, establish a loose but effective form of organization with headquarters for gathering together, with the aid of some well informed mind, the existing data on the alien problem in industry; not to waste time in making intensive local surveys for dramatic purposes, valuable as such surveys have been in the recent past, but to use the existing expert knowledge which will suffice to meet and cure any local difficulty if made locally available. The first essential is that some person who has given the subject comprehensive study, capable of thinking in large terms as well as in details, shall be enabled to give his time and thought unhampered to the work in hand. The next step is to map out a plan of campaign, to find out first just what the industries should do, how much cash and collaboration they must proportionately subscribe in order to assume their proper share of community responsibility.

#### Functions of the Manager

These are the preliminary steps. The manager selected to become the community advisor, friend, organizer, educator and guide must furnish the vision, tact, energy, enthusiasm, interest and information to weld the community into a living unit. He will enlist the help of opposing factions in the spirit of common service.

This is a method which has been adopted in those cities where the alien and labor problems have reached most nearly a satisfactory conclusion.

Wartime demands unity of action; wartime demands intelligent co-operation; wartime demands the utmost growth of every individual together with the submergence of personal aims of the individual to community service; wartime demands a get-together program. Now is the time for clear thinking. It is the time for a strong pull, and a long pull, and a pull all together. It is the time to get rid of old fogey notions. It is a time to throw over the autocracy in industry based on privilege, to centralize the responsibility of authority while decentralizing initiative and action. Now what does this mean? It means that the industrial manager must be the responsible authority, but that every one in his working force shall be provided with the largest opportunity to make the most of himself and so be able to give his best. By decentralization of initiative is meant that individual initiative shall be encouraged to its utmost limit. We speak of this as an age of machinery, but it is rather an age of men, for it is the man behind the machine who counts. No matter how

simple the job, intelligence is an economy. It is the intelligence of the shoveler, the yardman, the operator no less than of the boss, foreman, superintendent, manager, director and president, that counts. Although the responsibility for direction rests with tremendous weight upon the industrial manager, the capacity for direction must be equally developed in his coworkers.

#### Deepening the Human Touch

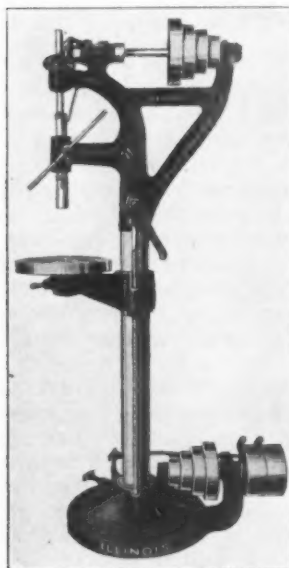
Let us face the proposition squarely and honestly. Let us recognize the necessity for deepening the human touch. Is your system of employment such that it provides you automatically with the knowledge necessary about all who are at work so that not only may the square peg be placed in the square hole, but in the right square hole too? If work conditions are faulty, unhygienic, inconvenient and irritating, if the relation of fatigue to efficiency is not studied, if it is thought that long hours of uninterrupted labor are proportionately productive, if matters of food, ventilation and lighting are not definitely in the hands of trained, informed and responsible executives, if the approach to the works is sordid, unkempt and repellent, if, in other words, your organization and work conditions are not arranged primarily to utilize the human factor to the best advantage, are you not really a back number as a manager, and should you not make good or else step down and out? If you are this passé person and your directors are really directing, you will be shelved, pensioned, retired, or otherwise pushed into a position of innocuous desuetude. We all know the manager who runs his works on the old fashioned military plan. His word is law. He is a martinet, a precisian. He wants no suggestion from any subordinate, and certainly gets none. His plant is effective in the old fashioned sense of the word, but he has been recently laid aside because the recurring strikes under his management were too costly. Such strikes come from the fact that autocracy in industrial management is out of date. We know, too, the other type of manager who as president of his company never has any labor disputes, and enjoys the largest success because he gives his entire thought to the selection of responsible human helpers, each a specialist in his own small or large field and all knitted close together by the intense human personality of the chief—chief by right of the fact that he is a man who realizes the high wages and short hours will never satisfy anyone and who recognizes that what a man wants is the largest freedom and opportunity for his own best activities and the well-being of those who are dependent on him.

If we have analyzed the situation correctly, we are brought to the conclusion that in every industrial center there should be a clearing house of information for the benefit of the management of every industry to put at the service of any executive a clear conception of just what the most recent developments have been with regard to every detail of the human factor in industry, because so rapid have been the strides of the art of industrial management on the human side in the last five years that without some such system no manager can keep himself up to date on this point and have time for anything else.

As a matter of fact, many industrial centers are beginning to appreciate this need and some have begun to provide in their chambers of commerce, boards of trade, or managers' associations, a method of supplying this needed information. Some large concerns have gone a long way in this direction individually, but they are hampered by the very fact that they are not putting themselves into close co-operative touch with other employers of labor. In this period of readjustment of employment, some industries are becoming paralyzed by the war and are throwing out of employment many thousands, while the war industries, on the other hand, are pushed to the limit to use every available human and mechanical aid to increase production. It is important in the extreme and would be an evidence of sanity, balance and business acumen if in every manufacturing center there could be instituted this get-together policy with regard to human administration on the human side in general and for employment of alien labor in particular.

### New Drilling Machine for Light Work

The W. W. Machine Works, Chicago, is manufacturing a 14-in. upright drilling machine specially designed to handle small and medium-sized work. In its design care has been taken to supply a machine of a durable character. Its height to top of cone pulley is 68 in., and it requires floor space 20 x 30 in. It will drill to the center of a 15-in. circle. The spindle has a No. 2 Morse taper hole and drills up to  $\frac{3}{4}$  in. The speed of the countershaft is 400 r.p.m.



Small and Medium Sized Work Is the Field of a Recently Developed Vertical Drilling Machine

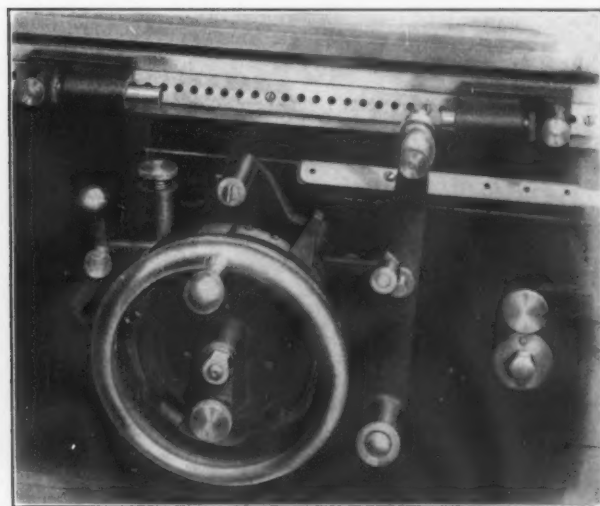
The base is provided with ribs on the inside and is unusually large and heavy, measuring 20 in. in diameter. The stationary head is cast integral with the column, affording great stability. The spindle is provided with a ball thrust bearing on the lower end to take up pressure when drilling. The spindle driving gear is fitted with a double-headed key of large size sliding in the splineway of the spindle. The gear has a hub 3-in. long, running on a flanged bronze bushing. The machine is distributed by the Stocker-Rumely-Wachs Co., Chicago.

### Improved Grinding Machine Cross Feed

Notable improvements have been devised by the Ott Grinder Co., Indianapolis, on its No. 2 universal grinding machine. The most notable feature is the cross-feed mechanism. Simplicity and ease of adjustment, it is emphasized, have been attained by using a single rocker arm, a spring plunger and a stop screw.

At the reversal of the table, the cross-feed rocker arm is tipped to its lowest position by a hardened pin on the reverse lever. As the table reverses the rocker arm is free to move upward, being actuated by a compression spring until the adjustable screw stop is reached. At the left end of the rocker arm a pawl engages the cross-feed ratchet wheel and causes it to rotate, giving the feed, which can be varied from 0.00025 in. to 0.003 in. It will be seen that the grinding wheel is fed in under power while the spring is relied upon only to give the feed adjustment.

The feed may be thrown out by rocking over the



A Single Rocker Arm, a Spring Plunger and a Stop Screw Control the Operation of the Improved Automatic Cross Feed

feed pawl or screwing down the adjustable stop. As formerly, the feed has an automatic throw out and also a positive stop when feeding by hand. The feed mechanism is simple, accurate and free to make adjustments while the machine is in operation.

### Pre-melting Ferromanganese in an Electric Furnace

The efficiency of an electric furnace in melting down charges of ferromanganese has been studied by Dr. F. Bittner of Breslau, Germany. He used a 3-ton Nathusius furnace and published his results in *Stahl und Eisen*. The *London Iron and Coal Trades Review* gives the following abstracts of his report.

Three-phase current was employed. It can be used of any convenient frequency. There were three pairs of electrodes. The three top or surface carbon electrodes were connected to the outer terminals of the secondary windings of the furnace transformer and the mild steel bottom electrodes to the inner terminals of the secondary coil. When working without a booster transformer the bath had to be heated almost exclusively by the electric arc as only about 4 per cent of the current input goes towards heating the bottom. With this system of connection the average load at the arc circuit is about 190 kw., while that of the bottom circuit is only about 8 kw. If, however, the bottom circuit is strengthened by the use of a booster transformer the average load at the arc circuit will be 171 kw., and at the circuit through the bottom electrodes 48 kw., or about 22 per cent of the total energy input.

As the principal advantage claimed for the Nathusius furnace lies in the possibility of heating the bottom, it is recommended to strengthen the bottom electrode circuit by means of a booster transformer. The following table compiled by the author shows the percentages of the total input, producing useful effects and loss respectively:

Portion of Total Input	Kw.-hours	Calories	Per Cent of Total Input
Used for melting the ferromanganese.	354.0	826,000	42.5
Used for melting the lime and forming slag	7.4	17,300	0.9
Lost in transformers	33.3	77,700	4.0
Lost in conductors	58.3	136,100	7.0
Lost in water cooling of electrodes	50.0	116,900	6.0
Lost in conduits and by radiation, including maintaining the heat of the bath	330.0	770,000	39.6
Totals per ton of metal	833.0	1,994,000	100.0

It will thus be seen that the efficiency of the furnace is very low (43.4 per cent), but in the author's opinion an electric furnace, working with a neutral zone, is eminently suitable for melting ferromanganese for, notwithstanding the high cost of current, the melting can be effected economically and without much loss of manganese, an important consideration when dealing with a deoxidizer. It should also be explained that the molten ferromanganese was used in connection with a basis Bessemer plant and had to be kept at a temperature of 1300 to 1350 deg. C. in readiness for the purpose.

The loss of manganese was only 0.385 per cent, a negligible quantity. The costs of melting a metric ton of ferromanganese in the electric furnace are given as follows:

	s.	d.
Current, 833 units	15	0
Electrodes	1	9
Wages	1	6
Depreciation of lining	0	6
Total per ton	18	9

Both the primary and secondary windings of the transformers were star-connected. The mean value  $\cos \phi$  was found to be 0.766 for the arc circuit and 0.740 for the bottom circuit.

For firebox steel for both locomotive and stationary service the manganese requirement under specifications of the American Society for Testing Materials has been put tentatively at 0.30 to 0.60 per cent.



## Book Review

**Office Organization and Management.**—By Carl C. Parsons, manager Shaw-Walker Co., New York. Pages 313, 5½ x 8¼ in.; illustrated by charts and half tones. Published by the La Salle Extension University, Chicago.

This volume discusses a large number of subjects relating to office work, including such topics as laying out the office, office employees, office training, rules and regulations, methods of payment, promotions, vacations, records and the office manager. It contains much good advice, but naturally there are many points on which many who have had experience in office management will disagree with the author. One of the important features of the book is a discussion of employees from the human side, and this unquestionably is a subject that deserves the constant attention of an office manager as well as of others in authority. In regard to constructive discipline, the author believes it is a settled principle that the honor list, with its awards, will correct bad habits in an organization more quickly than any penalty which may be imposed. He cites the case of one office where there had been difficulty in handling lateness which was reduced at least 50 per cent by a system of credits for promptness and rewards for conformity to the rules. Probably no one would question the importance of an office manager having the numerous qualifications of mind and heart which the author says he must have in order to be really successful. He expresses the opinion that successful office administration requires leadership which is able, intelligent, sympathetic, progressive and constructive.

Addressed to the undergraduate, but having a message to everybody, Clarence H. Stilson, Yale, 1897, has written a little book on getting on in the world. He has given it the title "After Graduation—What Then?" It is a compilation of terse bits of advice, which give the impression of coming from an experience and from observations which the author is desirous of putting at the disposal of others. While naturally the younger the person to whom the book may come, the better it is for him, it follows that he who has made the mistakes pointed out will more genuinely realize the value of the hints. The booklet, which is bound in paper covers and obtainable at 25 cents per copy from the author, who may be addressed at Waterbury, Conn., is one of that series of books of epigrams, truisms and quotations which are readable at any point. As appealing to the one at the beginning of his career, the book touches on in order: a purpose in life; what success really is; the school of life; the power of the present; the time element; right thinking, etc.

To the one who has been jolted to find himself possessed of no clear notion of a fact which he should have obtained and retained, say, from a book, a little pamphlet of 65 pages by Dr. George Fillmore Swain, prominently known in the civil engineering field from his long time teaching service on the staff of the Massachusetts Institute of Technology, will have an appeal. The booklet is entitled "How to Study," and is published for sale at 25 cents per copy by the McGraw-Hill Book Co., New York. It is, of course, intended chiefly for students and teachers, but it will bear perusal by the average man, who can hardly afford to stop studying. It is rather elaborately subdivided, so the reader may refer directly to any heading which meets the need at the time.

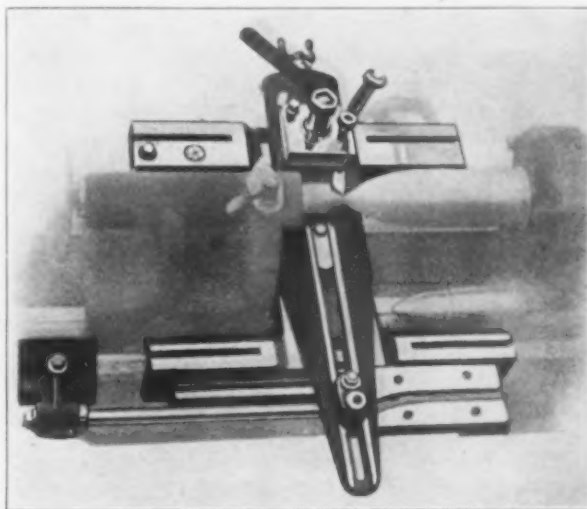
"The Primary Volatile Products of the Carbonization of Coal" is the title of an important technical paper, No. 140, by Guy B. Taylor and Horace C. Porter, issued by the Bureau of Mines. It is a continuation of the work described by Bureau of Mines Bulletin No. 1 on the character of the volatile matter of coal. In this later discussion the experimental methods have been refined and more precise results obtained. It is a study of basic phenomena in carbonization rather than of the ultimate results of these phenomena as a whole.

## Heavy Duty Lathe for Shell Production

The Cincinnati Lathe & Tool Co., 3207 North Street, Oakley, Cincinnati, is equipping its 18-in. lathes for the rapid production of shells. The equipment provided includes a 9-in. universal chuck, a square European tool post and a forming attachment with a cam to form shells of any radius.

The lathe is of heavy construction, the bed being reinforced by a number of internal box section girths. The headstock spindle is a high carbon steel forging finished by grinding and lapping. A collar is provided at the nose end which is relied upon to provide a stiff bearing when chucks and faceplates are used. The bearings are of bronze and a thrust bearing, consisting of a hardened tool steel collar with an adjustment for wear, is located at the rear end of the spindle, the end thrust being taken against the front end of the rear bearing. Lubrication of the bearings is provided by self-closing dust-proof caps in connection with grooves in the bearings.

The apron is of box type construction, thus providing a double support for all the shafts and studs. The rack pinion is of steel and located close to the rack on the bed and receives power through compound gearing. The longitudinal and cross feeds which are of the



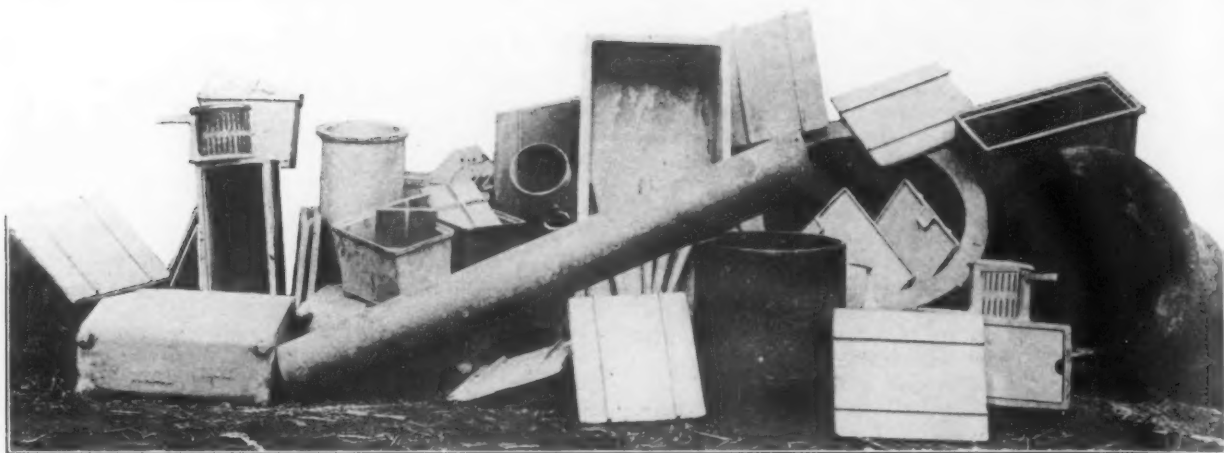
Shells of Any Radius Can Be Formed Rapidly by This 18-In. Heavy Duty Lathe Equipped with a Square Tool Block

friction type can be started, stopped or reversed while the lathe is running, but cannot be engaged while thread cutting is being done, and an automatic stop is provided for throwing out the feeds whenever desired. A thread chasing dial enables the carriage to be run back by hand and the thread caught at any point without reversing the lathe.

The reverse plate for cutting right and left-hand threads is on the outside of the headstock and is employed for reversing the lead screw only. A quadrant on the end of the lathe permits a combination of extra or metric pitches with the United States standard lead screw or vice versa, in addition to those obtained in the gearbox. The changes from one standard thread to another are readily made without duplicating or removing a gear by operating two levers conveniently placed a few inches apart. Operating a single lever provides nine feed changes. The gears are of forged steel and are assembled in a box which is mounted on the front of the bed and can be removed and replaced with another whenever desired.

The tailstock is of the offset type, permitting the compound rest to be set in a plane parallel with the bed. The spindle is large in diameter with a bronze nut for the screw and is locked in position by a clamping device.

In a test made of one of these lathes with the shell forming equipment, a shell of 0.50 per cent carbon steel with a 12-in. radius was machined at the rate of 204 ft. per min. at the point and 69 ft. at the end of the radius. The shell was completed in a trifle under 17 min., the depth of cut being ½ in. with a 1/32-in. feed and a spindle speed of 130 r.p.m.



Assortment of Carburizing and Annealing Boxes, Tubes, Baskets, Etc., of Cast Nichrome

## Castings That Withstand High Temperatures

An Alloy Which Under Heat Maintains Its Strength  
and Resists Scaling as Well as Change in Form

THERE is a demand for a metal or an alloy that will withstand high temperatures without any large alteration in tensile strength or especially any great change in its physical appearance such as scaling or oxidizing. If toughness and resistance to change of form are combined with the above-mentioned qualities, then a wide field of usefulness at once becomes possible. If it is also machinable, then its value is increased. A new alloy is being successfully made on a fairly large scale in the form of castings by the Driver-Harris Co., of Harrison, N. J. It is offered as possessing the properties named and is being used to advantage in several fields of industry.

The alloy is composed of about 60 per cent nickel and 14 per cent chromium, the remainder being principally iron. It is being melted in crucibles and poured in sand molds in a special foundry for this purpose. It can be cast easily and in various shapes and in any weight up to 1200 lb. It is known to the trade as "Nichrome." The fact that it can be used in practical service at high temperatures with extremely long life in

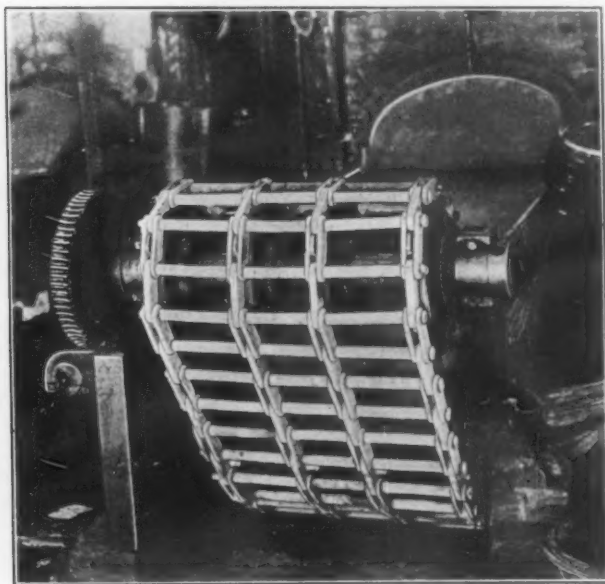
the form of castings, as compared with iron or steel, has enabled the company gradually to find many important industrial uses for it. The new alloy has now been made as castings for some time. Patents have been assigned to the company by John C. Henderson, an engineer of the company.

Besides its ability to withstand high temperatures up to 1800 to 2000 deg. Fahr. without alteration in form and with negligible oxidation, it possesses at these temperatures a strength of about 30,000 lb. per sq. in., according to the claims. Nichrome melts at about 2800 deg. Fahr. and when cold it has a tensile strength of about 45,000 to 50,000 lb. per sq. in. In addition the metal is very tough at 1800 deg. Fahr., and will bend considerably before breaking, even when red or white hot. A demonstration of this quality is often made by the company by heating to a red heat a plate of the alloy,  $\frac{3}{4}$  in. thick, and then striking it often with a 20-lb. sledge on the unsupported center of the plate. Stubborn resistance to bending has been the result in each case.

The general industrial application of this new alloy has broadened until it embraces annealing and carburizing boxes, heating retorts and conveyor chains used at high temperatures and other similar uses. It is being incorporated in the valve seats and valves of internal combustion engines, wire baskets and other utensils where either heat or acids and chemicals, or both at once, must be withstood.

The illustration at the head of this article represents a miscellaneous collection of various forms of boxes, baskets and containers used in carburizing, annealing, heat treating, etc. In fact, the use of the alloy as annealing and carburizing boxes is one of the important present industrial applications. It is the claim of the company that, as compared with cast-steel boxes under similar conditions, the Nichrome annealing or carburizing shapes last about 6000 hours as compared with 200 to 250 hours for the steel. The fact that it does not oxidize and scale off enables the Nichrome boxes to be made thinner and lighter, still maintaining the strength and also insuring more efficient heat conductivity.

The company itself has a practical application of this alloy which is interesting. In the heat



The Nichrome Conveyor Chain at the End of the Wire Annealing Furnace at the Plant of Driver-Harris Co.



treatment of its Nichrome wire it is necessary to pass it through a wire annealing furnace to a temperature of approximately 1600 deg. Fahr. It is necessary to seal the ends of the furnace with water to prevent oxidation by air. The wire is carried slowly through and out of this annealer on an endless chain. Because repeated heating and cooling would soon destroy an ordinary chain, the company uses one made of Nichrome which has met the conditions extremely well. One of the illustrations shows this chain installation in operation.

Another illustration shows the use of Nichrome dipping baskets used in immersing heated iron or steel in cyanide baths for carburizing. Similar baskets or utensils are used for pickling purposes and heat-treating work. One is reported to have been used six months in acid dipping where it was subjected to 40-deg. nitric acid, 40-deg. muriatic acid and 66-deg. sulphuric and as well as a mixture of several acids. Signs of the metal being affected were lacking in all these instances.



A Dipping Basket of Cast Nichrome Used in Immersing Iron in a Cyanide Bath

Another important application is the use of this alloy as pyrometer protection tubes. This type of tube in the cast form is said to be extensively used and to be rapidly displacing the easily broken porcelain ones. In one case such metal tubes showed a life of 4000 hours.

The question of the use of this alloy as crucibles is now a matter of research. Experiments thus far indicate the possibility of its adaptability to containers for melting brass, bronze, phosphor copper and other alloys successfully. Such a substitute for graphite crucibles would be a decided advantage under present conditions.

A new foundry, equipped with a 2-ton Heroult electric furnace for melting the alloy, is now under construction at a cost of over \$100,000.

#### Ferromanganese Imports Low in June

The imports of ferromanganese for the month of June were the lowest of any month this year excepting May. The total for June was 2717 gross tons as compared with 2019 in May and an average of 6190 tons for the first four months of the year. The June receipts were received as follows: Through the port of Philadelphia, 500 tons; through the port of Baltimore, 1735 tons; through the port of New Orleans, 482 tons. Total receipts for the first six months of this year have been at the rate of 4916 tons per month as compared with 7577 tons per month in all of 1916.

## TO ABANDON SANDY HOOK

### Kent Island Proposed Proving Ground for Cannon, Armor and Ammunition

WASHINGTON, July 31, 1917.—The War Department has decided to abandon Sandy Hook as a proving ground for big guns and Secretary of War Baker has transmitted to Congress through the Treasury Department a request for an appropriation to purchase Kent Island in Chesapeake Bay "to be employed for the testing of cannon, ammunition and accessories." This announcement has drawn a vigorous protest from Senators and Representatives from Maryland, in which Kent Island is located, and who have been appealed to by some 3000 residents of the island who are unwilling to surrender their homes, although guaranteed liberal indemnity.

The decision to abandon Sandy Hook, which for many years has been employed for the testing of big guns, has been foreshadowed for some time in the reports of ordnance officers. Two important considerations have moved the War Department to act in this matter. From a military standpoint Sandy Hook is badly located for defensive purposes and the recent tendency in both War and Navy departments has been to place all manufacturing, testing and storing establishments far enough from the seacoast to prevent them from being captured or damaged in the event of a sea attack by an enemy. The other consideration, which is becoming daily more pressing, is the danger from gun fire to the shipping congested in the vicinity of Sandy Hook. There have been several narrow escapes from serious damage to vessels and the necessity for avoiding this menace imposes drastic restrictions upon the officers in charge of the testing operations.

Kent Island, which it is proposed to purchase for use as a proving ground, has been fixed upon by a board of ordnance experts after the examination of many localities. It is said to afford the only available range for the firing of guns carrying up to 17 miles that would be entirely safe to life and property. The department's plan is to acquire the entire island, purchasing the property from private holders, and to establish all necessary facilities for the handling, mounting and testing of big guns, ammunition, etc. It is also possible that a storage depot for ammunition reserves may be located on the island. While the projected site can be easily approached through deep water from the Atlantic, it is regarded as amply protected by fortifications at the Capes, and the fact that it is an island would facilitate War Department officials in preventing any form of hostile espionage.

Opposition to the acquisition of Kent Island will be encountered in both houses of Congress. Senator Smith of Maryland and Representative Price, who resides in the district in which the island is located, have already taken the matter up with the War Department and have announced that they will fight any measure carrying the proposed appropriation that is presented. The island is said to be exceedingly fertile and this fact will be urged as an argument against the War Department's plans. If Secretary Baker's project is adopted it will mean the passing of historic Sandy Hook as a proving ground for big guns, but the Government will probably retain its reservation indefinitely. W. L. C.

The Cutler-Hammer Mfg. Co., Milwaukee, maker of electric controlling devices, lifting magnets, etc., has made a gift of a fellowship of \$400 for research work in physics to the University of Wisconsin, Madison. The deed states that the object of the gift is to initiate co-operation between the industries of the state and the university in working out problems of a scientific nature.

The annual congress of purchasing agents under the auspices of the National Association of Purchasing Agents, will be held at Pittsburgh, Oct. 9, 10 and 11. The program includes business sessions for the mornings and visitation and inspection of industrial works during the afternoons.

# Pushing Destroyers and Merchant Ships

Plan for Submarine Chasers Abandoned—Shipping Board Activity with Edward N. Hurley as Chairman

WASHINGTON, July 31, 1917.—An important change in the plans for fighting the submarine has been decided upon by the Navy Department and as the result the project of constructing a large fleet of 160-ft. submarine chasers heretofore determined upon has been abandoned, and orders will be speedily given both to navy yards and private shipbuilding plants to concentrate their efforts upon the production of the largest possible number of torpedo boat destroyers. Construction experts from all the navy yards have been summoned to Washington for conferences on the new building program and representatives of private yards have already given assurances not only as to their ability to turn out a large number of destroyers but as to making deliveries in record-breaking time.

## Many Destroyers to Be Sent

The new move of the Navy Department is understood to have two objects, namely, the protection of the commerce of the Atlantic from the submarine and the strengthening of the American Navy with a view to its participation in what is referred to here as the "big spring drive" against the German fleet and naval bases which, according to rumor, is scheduled for next March or April. The experience of the past three months has demonstrated that the destroyer is by far the most effective opponent of the submarine. This fact has been emphasized by the work of the American destroyer flotilla operating in European waters under Admiral Sims, which has drawn high compliments from European naval authorities. Recent experience has also made it perfectly clear that the small submarine chaser, approximately 100 ft. in length, is much less effective either in attacks on submarines or for conveying purposes than was hoped, and while all these vessels now on the ways will be completed, it is probable that very few additional boats of this type will be built. So unsatisfactory have these small vessels proved that the Navy Department will build few, if any, 160-ft. boats of this type. While these vessels are swift they are practically unprotected, and they cannot carry armaments enabling them to cope with the latest type of German submarine, which not only carries comparatively heavy guns but is well protected with a 3 or 4-in. belt of armor and is provided with a heavy conning tower.

## Advantages of Destroyers

The destroyer, on the other hand, is built to stand a great deal of punishment. She is fitted with watertight compartments and makes an excellent gun platform in spite of the fact that she is designed primarily for speed. The fact that she is much faster than any submarine gives her a tremendous advantage, while the placing of her batteries and the rapidity with which they can be handled render it almost a certainty that she will sink any submarine that comes up within range.

Few details of the new program for attacking the submarines are available, Secretary Daniels contenting himself with the announcement that it has been decided to "build more destroyers than we ever dreamed we could build." The entire quota authorized by the last naval appropriation act was contracted for several months ago, and at that time the department also placed orders for an additional number to be paid for out of the emergency appropriation of \$150,000,000 which Congress placed at the disposal of the President. This fund has been heavily drawn upon during the summer, but it is understood that less than half of it has been mortgaged and that a large part of the remainder will be used to pay for the newly projected destroyers. These vessels are estimated to cost about \$1,250,000

each, and experienced observers here will not be surprised to learn that the Government contemplates building at least fifty in the shortest possible space of time. The estimates to be submitted to Congress next December will include an unusually large item for more destroyers, and in the improvements and extensions of Government navy yards, for which Congress is now providing, special attention will be given to facilities for the rapid building of vessels of this type.

## Shipping Board Problems—Steel, Wood and Labor

The reorganization of the Shipping Board, which took place during the past week, is counted upon to expedite greatly the construction of the big emergency fleet, the function of which will be to offset the inroads on commerce made by the submarine. At a meeting of the board on July 27 Edward N. Hurley was elected chairman and Rear Admiral Washington L. Capps was appointed general manager of the Emergency Fleet Corporation. The resignation of Thomas Brent, vice-president of the board, was accepted by the President and R. B. Stevens, a member of the board, was tentatively designated to act as vice-president. Chairman Hurley is reticent in discussing the plans of the board and is devoting himself entirely to familiarizing himself with what has already been done and with the condition of the industries he must call upon for speeding up the construction program. There are three problems now confronting the board, he says: adequate supplies of steel, wood and labor. The labor, especially that intended for the steel ships, will be provided without serious difficulty, although it will not be easy to find an adequate force to build a large number of wooden ships. There are also limits to the supplies of steel for immediate delivery and of seasoned lumber, and there are transportation difficulties to be encountered as to the latter.

An early task before Chairman Hurley and Admiral Capps is the formulation of a definite program with respect to the two shipbuilding establishments to be equipped for Government construction. General Goethals developed these plans rapidly and they must be carefully gone over before they are finally approved. This action will be taken at the earliest possible moment.

## Eighty Weeks' Riveting for 1000 Ships

An expert of the Bureau of Construction of the Navy Department has made the interesting calculation that the building of 1000 steel ships would require the labor of 7000 steel riveters working steadily for 80 weeks. This estimate is based on experience both in navy yards and in private shipbuilding plants which accept the number of rivets to be driven in the building of a ship as a unit of measure for determining the factors of labor and date of delivery. After a contract for a steel ship is entered into about two and a half months are consumed in preliminary construction before the riveting begins, but from that time on it proceeds without interruption until the vessel is substantially completed. The steel ships planned by the Shipping Board are estimated to require approximately 400,000 rivets or 400,000,000 for a fleet of a thousand such vessels. On this basis, rivets must be driven at the rate of 5,000,000 for eighty weeks to finish the work on time. Naval experts doubt that a sufficient number of skilled riveters and other mechanics familiar with structural and plate work for shipbuilding can be found to meet the requirements of the Shipping Board, but it is understood that Admiral Capps is planning to use experienced men as foremen and with their aid to instruct large gangs of structural steel riveters familiar



with bridge and building work so that in a short time they will in turn become experts.

#### Direct Methods in Getting Ships

The encouraging intimation has been given out here that Admiral Capps is planning to dispense with much of the red tape with which naval construction is surrounded and that he will employ many of the direct time-saving methods adopted by General Goethals. The element of prime importance, especially in the construction of the projected steel ships, will be standardization of every possible detail. This principle will be kept in mind in the layout of the yards, in the selection of equipment, in the designing of hulls and, so far as practicable, in the building of motive power units. The use of large fabricating plants for the preparation of the structural material will assist in this movement, and it has been decided to employ steel templates throughout to insure accuracy in the construction of the large number of vessels to be built. Difficulties will undoubtedly be encountered in securing a sufficient number of engines, boilers and other items of equipment of a uniform type and it is probable that there will be many departures from the standards in this respect. At the suggestion of former Chairman Denman the board has already contracted for a large number of wooden hulls without machinery or equipment of any kind, and to fit out these ships will constitute a separate problem.

It is understood that the first work to be taken up in the Government shipyards will be the construction of a master ship, which will be built by continuous work and carried to an advanced stage of completion while preparations are being made for other ships, including the fabrication of steel and the assembling of material. While the adoption of this method may delay the laying of keels somewhat, it is believed it will result in earlier and more rapid deliveries of completed vessels.

W. L. C.

### DEFECTS IN BRASS TUBES\*

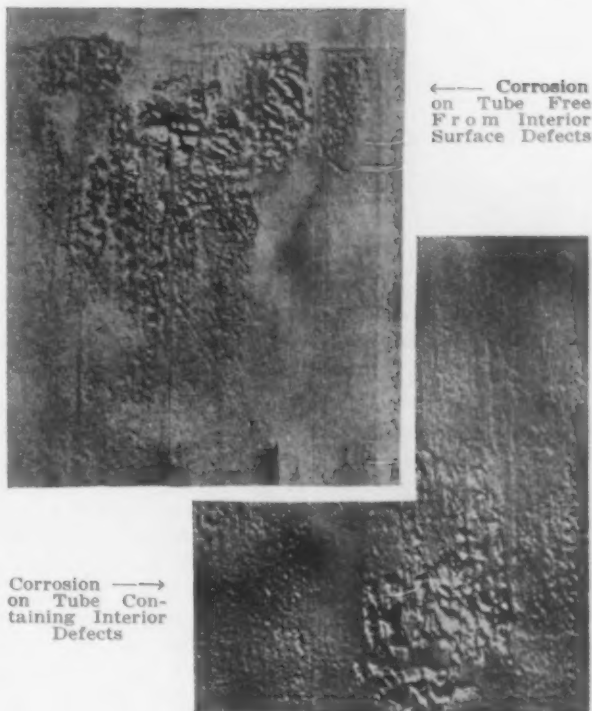
#### Evidence Against the View That They Are Causes of Corrosion

IT is a common experience to find clauses in specifications which have been adopted by the writer thereof because the requirements which they demand appear to be reasonable but which have, as a matter of fact, no basis either in theory or experience.

Certain users of brass condenser tubes have been impressed with the belief that interior surface defects operate to produce corrosion which exhibits itself as local pitting, terminating in perforation. The writer at one time held this belief and took occasion to make a careful examination of every case of corrosion of this character which came under his notice, with a view of observing whether there was any evidence in support of it. No case, however, has ever been found by him which would support any such view.

It has further been observed that there is no tendency whatever for areas of corrosion to localize in the vicinity of such defects. Moreover, many cases have been found in which severe pitting had occurred in the vicinity of such defects, but absolutely no tendency of the corroded areas to follow along the lines of defect has ever been noticed.

A recent case of severe corrosion was observed which furnishes very strong evidence that no such connection exists. The tubes had been in service in the condenser of a large stationary plant for six months and were removed because of perforations caused by local corrosion on their interior surfaces. Of a lot of 11 tubes, eight were found to be absolutely free from surface defects near the corroded areas, while three samples were found to contain such defects. These tubes were sawed longitudinally and opened out flat so as to show



← Corrosion on Tube Free From Interior Surface Defects

Corrosion → on Tube Containing Interior Defects

the interior surfaces. Characteristic samples from the unblemished tubes were taken and photographed for comparison with those containing surface defects, two of these photographs being reproduced herewith. They are approximately eight-tenths the size of the tubes. They show very clearly the surface defects and the location of the corroded areas with respect to them.

Even where a corroded area crosses a defect, no tendency whatever for the corrosion to follow the defect is observable. In most of the samples the corroded area was confined to a distance not over 4 in. from the inlet end of the tube; the remainder of the tube being as free therefrom as when first made. In one or two cases the corroded area was similarly confined to a short distance in the length of the tube, but was some distance from the end thereof.

The effect which temperature has upon corrosion is very well shown by the fact that the corroded area in most cases stops quite abruptly on reaching that portion of the tube which is in contact with the tube sheet. There would be naturally a very considerable difference in temperature between the portion of the tube which was in contact with the tube sheet and that which was in contact with the steam.

This evidence is not intended to be considered as arguing in favor of the presence of defects of this character. It is, however, a fact that evidence of their existence can be largely removed by treatment which detracts from the resistance of the tube to corrosion, while on the other hand they are rendered more highly visible by treatment which tends very materially to increase this resistance.

As a consequence, tubes treated in a manner tending to decrease their serviceability will frequently be accepted under specifications containing restrictions of the character in question, but would be rejected when made in accordance with methods calculated to give them the maximum endurance.

It, therefore, follows that a rigidly interpreted clause of this nature may operate to weaken rather than strengthen the specifications of which it is a part.

The Dreis & Krump Mfg. Co. is constructing a one-story brick addition to its factory, 22 x 83 ft. This building is to be used as a steel warehouse and will be equipped with a 3-ton crane.

The Pangborn Corporation, Hagerstown, Md., has purchased and taken over the sand-blast department of the Curtis Pneumatic Machinery Co., St. Louis.

\*From a paper presented at the twentieth annual meeting of the American Society for Testing Materials at Atlantic City, N. J., June 26 to 29, 1917. The author, W. Reuben Webster, is general superintendent, Bridgeport Brass Co., Bridgeport, Conn.

# Devices to Facilitate Shell-Machining

Unique Tool for Centering Forgings—Improved Mandrel to Expedite Lathe Work and Better the Quality of the Product

BY ENOS MOORE\*

IT is quite likely that there are not two good mechanics in the world who will agree on any one device as being the best of its kind. If there is a good mechanic who has an argument to offer in support of the driving plug for turning shells, illustrated in Fig. 1, hundreds of which I have seen in use, then it would be interesting to hear from him.

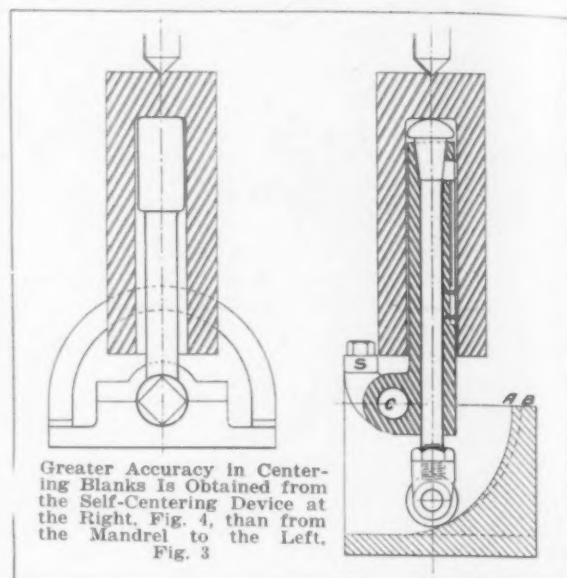
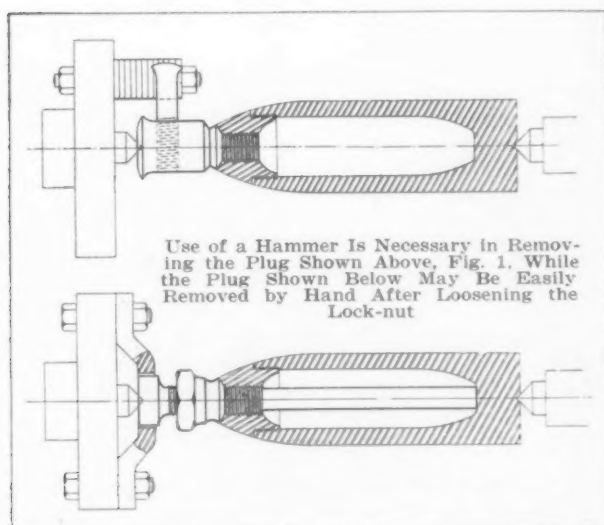
It has several bad features. The worst is that after a shell has been turned with it, nothing but the skillful use of a hammer will get it out, and in about half of the work done with it the socket is loosened with the plug. This means that a new socket must be screwed in and the turning done over again. Again, unless all plugs are of the same length, the short ones will ruin the shells on which they are used, unless the operator has discovered the difference and made the necessary change in his taper attachment.

With one operator running two lathes on finishing work, it is customary to furnish four plugs of the kind shown, two in the lathes and two for shells on the floor. The taper attachment should, of course, never be touched after it is set correctly. The method shown for driving these plugs is so primitive that I would not have called attention to it unless I had seen it in use on new lathes.

From Fig. 2 it will be seen that a shell could easily be turned without the lock nut because the mandrel is jammed against the bottom of the bore, where all lengthwise measurements should be based. For quick work, however, the thread on the mandrel should run easily through the thread in the socket, and the lock nut serves to center the shell. As soon as the finishing cut is taken the least resistance will loosen up the nut while the shell is still turning and the removal of the mandrel is but a matter of turning it by hand.

This simple device would have saved at least one large manufacturing concern, with whose operations I was acquainted, many thousands of dollars on certain contracts that were gotten out for the Allies, and there was not a day during

\*Birmingham, Ala.



almost two years when the change could not have been effected. The old plugs, however, were turned out in hundred lots and the destruction of sockets went merrily on.

I have called attention to this, simply for the saving that it would effect to the manufacturers. But there is a more serious fault illustrated in Fig. 3 through which the Government, or the purchaser of the shells, is made to suffer a certain very definite loss in the quality of the product. This should be eliminated and a change enforced by the United States officials.

The primary operation in any shell shop, where the forgings are delivered for finishing, consists in centering the blanks, ready for rough turning and boring. If this centering is done correctly, it insures a truly concentric job on the whole series of operations which follow; but if the centering is not done correctly, with reference to the piercing, then a black spot follows the boring and there is no way in which such an imperfection can be remedied. The common method of procedure in such a case consists in hiding the defect by means of a small emery wheel with which the rough edges of the cavity are ground off and the surface polished.

This, however, does not remove the lopsidedness of the shell, but rather accentuates it, so that the path of such a shell, leaving a rifled gun, will be a spiral instead of the expected trajectory.

For this centering operation there is usually employed an attachment to an ordinary drill press, something as shown in Fig. 3, by means of which the rough forging, weighing about 125 lb., is slipped on to a mandrel which, by means of a lever (not shown) and an arc, is first brought to a horizontal position for receiving the forging. When the forging is slipped over the mandrel the operator grasps his lever and, by means of a notch and a dog on the lever, he brings the shell to a vertical position and holds it there while the drill is brought down to do the centering. This is laborious work because the lifting of the forg-



ings on and off the mandrel involves handling about 25 tons of metal per day.

A glance at Fig. 3 will satisfy any kind of a mechanic that the chances for centering any forging on such a fixture are all against doing it correctly. In the first place, there must be a rough allowance for getting the shell over the end of the mandrel and, when the mandrel is in a horizontal position, that clearance is just doubled on one side. If allowance be made for the lost motion in the notch in the arc and the dog on the lever, it can easily be understood how  $\frac{1}{4}$  in. might be lost on one side of the hole and the shell rendered eccentric by that much. If the shell is centered  $\frac{1}{4}$  in. off, no matter how rigid the boring machine the shell will come out with a black spot and be eccentric.

The remedy for this is a self-centering device such as that shown in Fig. 4. Regarding this, it will be seen that the shell is brought to a stop by a positive member, or rather two of them, S, one on each side of the opening through which the shell travels. The weight of the shell and the pressure of the drill both tend to hold the mandrel in the only position that is left to it.

If an arc is described around the trunnion center, as shown by dotted line, nothing will happen to the plunger, but by making a track for the castor, A, about a half inch forward of the arc, B, it will be seen that, when the shell is lowered to a horizontal position, the plunger is forced out with the shell, releasing the three centering dogs, so that the shell will be perfectly free.

Conversely, if the rough shell is placed on the mandrel while in a horizontal position and then raised to a vertical position, the weight of the shell will drive the tapered plug down until the three sharpened dogs will find a solid bearing and the result will be a centering true to the piercing.

#### Tests of Steel Hardened by the Wild-Barfield Process

An interesting report on tests recently made for the Hardness Tests Research Committee at the National Physical Laboratory (British) on steel specimens treated by the Wild-Barfield process has been published in the *London Iron and Coal Trades Review*. The process is the one used for hardening screw gages in large quantities for the Ministry of Munitions. The report states:

The steel contained 1.5 per cent carbon and 0.49 per cent manganese. Of the four specimens two (A and B) were quenched in cold water of 15 to 20 deg. C. after being heated to 10 deg. C. above the recalescent temperature before quenching, while the other two (C and D) were treated by the Wild-Barfield process. Unfortunately, specimens A and B had to be ground away in parts in preparing them for the testing machine. Consequently their worn surfaces, after removal from the testing machine, were found to consist of patches alternately highly polished and matte-like in appearance. The latter patches gave low numbers, while the former supplied high numbers in the scleroscope test, vitiating somewhat the comparisons. A truer comparison is furnished by the Brinell hardness tests which were made on specially prepared flats. The numbers were 438 and 423 respectively for A and B, and 310 and 340 for C and D, that is lower; yet the resistance to sliding abrasion was higher for C and D (560 to 710) than for A and B (420 to 560). The sliding abrasion tests were made in the special machines described in the report of the Hardness Tests Research Committee of last November.

The Colt Patent Firearms Mfg. Co., Hartford, Conn., has announced that it has recently received orders for 20,000 Browning machine guns.

#### Effect of Various Elements on the Strength of Cast Iron

Results of experiments by F. Wuest and his German pupils to determine the influence of carbon, silicon, manganese and phosphorus on the mechanical strength of cast iron are given in *Stahl und Eisen* by A. Stadeler. From a translated abstract in the *London Iron and Coal Trades Review* the following is taken:

Various mixtures were prepared of Swedish charcoal pig with Swedish horseshoe iron, the silicon, manganese and phosphorus contents being varied by the addition of ferroalloys. As square or rectangular test bars are liable to develop a white iron at the edges, test bars cast round and turned down were used in the experiments.

The quantity and character of the graphite appear principally to determine the mechanical properties but these are materially influenced also by the pouring and method of cooling. With gray iron containing 1.5 per cent silicon, small quantities of manganese up to 0.3 per cent increase the formation of graphite, but a further increase to 2.5 per cent has no influence. Cast irons high in phosphorus, contrary to existing ideas, may be improved by the presence of 1 per cent of manganese or more provided the rest of the ingredients have been fixed properly.

With a rise in the proportion of graphite the strength of the iron in tension and bending falls off as a rule. This is also the case with an increase in the percentage of carbon and silicon, both of which favor the formation of coarse graphite. With increase of phosphorus up to 0.3 per cent and of manganese up to about 1 per cent, the strength in tension and bending increases. Phosphorus up to 0.3 per cent and also a high graphite content enhance the bending strength, while manganese and silicon have the opposite effect.

The resistance to specific impact shows the greatest sensitiveness to silicon, manganese and phosphorus. It diminishes rapidly as the phosphorus content rises until this reaches 0.6 per cent, above which the decrease is inconsiderable. This property brings out the superiority of irons low in phosphorus in respect of resistance to impact, which the tensile and bending tests fail to reveal.

Hardness decreases with a rise in graphite content and is increased by a rise in manganese and phosphorus. It does not seem to be affected by the silicon content, but the physical properties of cast iron depend not only on the percentage but also on the character of its graphite content. An explanation of the difference in the physical properties of test pieces containing the same percentages of carbon can be readily found by an examination of their microstructure.

#### Women Employees in the United States

Figures as to the increasing employment of women in the United States are given as follows in a late census bulletin: There were 3,596,615 women over 16 years of age engaged in industrial occupations out of a total of 18,957,672 in 1890, the proportion being 19 per cent. In 1900 the number of those employed rose to 4,833,630 out of a total of 23,485,550, or 20.6 per cent. In 1910, on the other hand, the number of women over 16 years of age employed rose to 7,438,686, out of a total of 29,188,575, or 25.5 per cent. The proportion of the single women employed to the total number of such women grew from 43.1 per cent in 1890 to 45.9 per cent in 1900 and to 54 per cent in 1910. The percentage of the widowed and divorced advanced from 29.9 in 1890 to 32.5 in 1900, and to 34.1 in 1910. The proportion of the married women employed to the whole number of married women increased from 4.6 per cent in 1890 to 5.6 per cent in 1900, and 10.7 per cent in 1910.

The Crompton & Knowles Loom Works, Worcester, Mass., is preparing to erect the first of a series of additions. The first unit will be a storehouse 62 x 200 ft., four stories, located opposite its foundry and connected with it by a bridge.

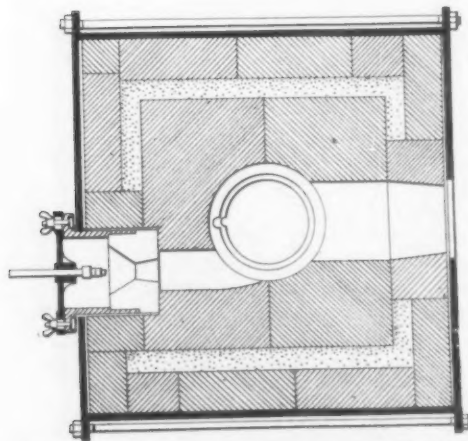
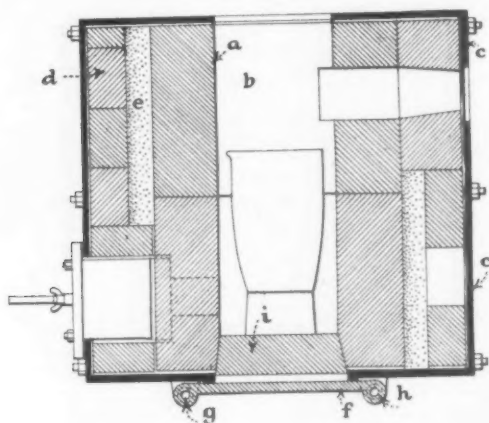
## HIGH PRESSURE GAS FURNACES\*

## A Brass and Bronze Melting Outfit Utilizing an Atmospheric Burner

METAL melting furnaces, operated with city gas, may be classified as furnaces designed to operate at ordinary city gas pressures of 2 to 3 in. of water, and fitted with atmospheric burners, and those designed to operate with gas at city pressure and air under a positive pressure of 1 to 2 lb. per sq. in. The first are used chiefly for melting alloys not requiring a higher temperature than 1100 deg. Cent., including aluminum and gold alloys and white metals. They employ pots having a capacity up to 150 lb. of copper and furnaces employing gas at pressures considerably higher than the ordinary distribution pressures and fitted either with atmospheric burners or burners using air under a pressure of about 20 in. of water. The second group may be subdivided into pit and and tilting furnaces for melting brasses, swarf and scrap, for the production of castings, strip metals, ingots and billets, the size of crucible varying from 60 to 800 lb. capacity; furnaces for melting nickel, cupro-nickel and bronze, and furnaces for melting aluminum alloys and precious metals. Under this last head there are pit furnaces for melting brasses and bronzes for sand castings, ranging from 60 to 200 lb. capacity; pit furnaces for melting brasses, bronzes and cupro-nickel for strip and billet castings, having pots of capacities up to 200 lb.; pit furnaces for aluminum alloys having pots of capacities of from 200 to 600 lb. of copper; small furnaces for melting precious metals, and furnaces for melting brasses, bronzes, pure nickel, and for non-ferrous metals generally where extremely high temperatures and high melting speed are required.

The accompanying illustrations show the details of a 60-lb. furnace using high pressure gas in an atmospheric burner and suitable for melting brasses and bronzes for sand casting work. The brick lining *a*,

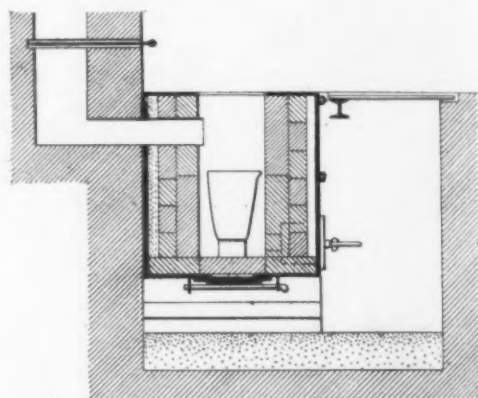
\*From a paper read before the Institute of Metals (Great Britain), March 22, 1917, by C. M. Walker.



Details of a 60-Lb. Brass and Bronze Melting Pot Furnace Employing High Pressure Gas in an Atmospheric Burner

built in sections, has a cylindrical core *b* of a diameter to suit the pot employed and is contained in a box of loosely bolted cast-iron plates *c*. Between the outer lining *d* of 4½-in. firebrick and the lining *a* is a space of 2 in., packed with non-conducting material *e*. The bottom plate forming a bed is supported on brick piers in the furnace pit. The circular opening in it is closed by the plate *f*, held in place by the hinge *g* and the drawbar *h*. On this is built the furnace bottom *i* consisting of about 3½ in. of well-rammed ganister and broken brick. The pot rests on a fire-brick stand leaving an angular combustion space between the pot and the lining.

The dimensions of the combustion space are important if high temperatures and efficient working are to be obtained. Where the pots are to be removed by tongs, only sufficient clearance should be given around the pot to allow easy manipulation of the tongs. The high pressure injector burner enters the combustion space tangentially about ½ in. below the bottom of the pot and the flame forms a spiral round the pot. The flue, fitted with a nostril, enters the furnace about 2 in. above the pot rim.



General Arrangement of the Furnace Pit and Flues

Gas is supplied to the burner at a pressure of about 12 lb. per sq. in. At this pressure the requisite air for combustion can be injected and a mixture velocity of about 6000 ft. per min. obtained in the injector throat. The velocity of the mixture entering the furnace is about 5000 ft. per min. The above figures were obtained with a gas of a net calorific value of 500 B. t. u. per cu. ft., having a density of 0.52 (air equals 1) and requiring 5.5 volumes of air for complete combustion. These figures will be used in the following discussion:

At the above mixture velocity, the combustion was sufficiently concentrated and the flame temperatures high enough to meet all the usual requirements and to melt cupro-nickel. Where extremely high temperatures are required, as for melting pure nickel, the velocity of mixture entering the furnace may be increased with advantage to 9000 ft. per min.

In melting 60 : 40 brass in 50 to 60 lb. pots for sand castings with gas of 500 B. t. u. per cu. ft., 9 to 10 heats can be made in 12 hr. The first heat takes about 2 hr. and subsequent ones about 1 hr. each. The average gas consumption with a single injector burner would be about 280 cu. ft. per hr. and the gas per lb. of 60 : 40 brass melted about 5 cu. ft. If the standby losses are high due to molds not being



poured promptly, this figure will be exceeded.

The cost of a furnace of the size and type illustrated exclusive of pit work, excavation and connection to existing flues, amounts to approximately \$125. A similar furnace of 160-lb. capacity should cost about \$175. The cost of maintenance of a 60-lb. furnace, including relining, patching, and rebottoming each week, and one set of burner cone replacements, was approximately \$41.50 for one year, during which time about 60 tons of metals were melted. The maintenance of a 160-lb. furnace for six months was \$47.50 and 160 tons were melted in that period. The pot costs vary with the method of working. For 60-lb. pots a good average figure is 30 heats per pot where sand castings are made, and 8 to 10 heats per day are the maximum required. If the speed of working is increased, the number of heats per pot is also increased in about the same proportion. When melting borings or swarf requiring puddling, the pot life is reduced, owing to the mechanical wear on the pot. If the speed of melting can be increased from 8 to 12 heats per day, the pot life can be increased to about 40 heats. With strip and billet castings in 130 to 200 lb. pots, melting 10 heats per day, the average life per pot will be about 26 heats.

#### Sources and Amount of Metal Losses

The metal lost during the melting of brass consists of spelter volatilized and carried off with the waste gases; metal oxidized to form a dross, and metal spilled over the sides of the pot. The first two are non-recoverable and the third recoverable. To reduce the losses to a minimum, the temperature regulation should be under complete control to prevent overheating of the metal and consequent loss of spelter. Further, the atmosphere in contact with the metal should be non-oxidizing or slightly reducing to prevent the formation of dross.

Metal losses stated in terms of pounds of metal per hundredweight of castings produced are of little value for purposes of comparison. Therefore, it has been found desirable to use the loss of metal, on the basis of the weight of metal melted for a given process, including the returns. Assuming that all of the original metal is converted into billets, castings, or strip as the case may be, this figure for the loss of metal multiplied by the ratio

$$R = 1 + \frac{\text{weight of returns}}{\text{weight of castings produced}}$$

gives the approximate loss based on the work produced if the ratio is known. The ratio  $R$  really represents the number of times a given quantity of metal must be remelted to convert it into castings. The accompanying table gives values of metal losses for different classes of work when melting by high pressure gas.

Figures of Metal Loss Obtained When Melting with High Pressure Gas Furnaces.

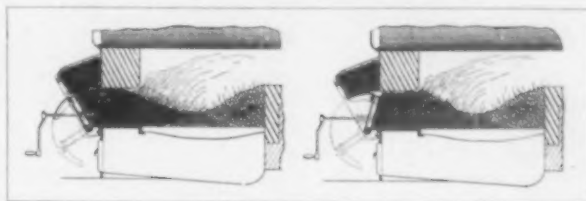
1	2	3	4	5	6
Metal Melted	Work Produced		Loss on Metal Melted, Per Cent	Loss on Work Produced, Per Cent	Capacity of Furnace, lb.
62 —brass	Very light cored castings	2.0	2.05	4.1	60
38 —brass	Medium cored castings	1.5	2.20	3.3	60
40 —brass	Medium cored castings	1.6	2.18	3.5	60
40 —brass	Billets	1.18	1.52	1.8	130
72 —brass	Strip	1.05	0.59	0.56	160

The percentage loss figures given in column 5 are those actually obtained from tests, and represent the loss of metal on the castings, etc., produced, while the figures given in column 4 represent the loss of metal on the metal required to be melted to produce these castings, as computed from the ratio factors given.

The 50 new coke ovens of the Wilkeson Coal & Coke Co., Wilkeson, Wash., have been completed and put in operation, giving the company 160 coke ovens in operation.

#### Special Firing Door for Boilers

A firing door which, it is claimed, makes it possible to use the coking method of firing, has been brought out by the Economy Furnace Appliance Co., 38 West Divi-



The Coal in Front of the Firing Door at the Left Is Pushed into the Firebox by Turning a Crank and the Gas Which It Contains Is Gradually Driven Off and Burned

sion Street, Chicago. Aside from eliminating the entrance of cold air when coal is being fed to the furnace, the loss of heat by radiation through the fire door is also claimed to be prevented, and the heat is utilized in driving the gas from the coal to be burned. The location of the hopper above the firing door on the front of the boiler is also relied upon to dry the coal and remove moisture that would otherwise have to be driven out of the coal in the furnace.

The door can be used with either horizontal return tubular or firebox boilers. In either case the coal hopper is located above the door, as shown at the left of the accompanying drawing. The coal from the hopper fills the space in front of the firing door, which is pivoted at the bottom. When it is desired to add fresh fuel to the fire, the crank which is located at the side of the door is turned enough to tilt the door so that coal will fall from the hopper into the space between the coal that is being coked and the front of the door. When the crank is turned in the opposite direction, the coal is forced into the furnace as the door travels upward, this movement also breaking the coal that has been already coked. For cleaning the fires the door can be lowered to the position indicated by dotted lines.

With this door the coal is heated and becomes coke, the combustible gas being driven off. This gas passes back over the grate and, it is emphasized, is completely burned as it passes over the incandescent coke bed at the back of the fire. The coke is pushed along as successive charges of coal are introduced to maintain an incandescent coke bed at the back of the grate.

#### New Furnace Blown In

YOUNGSTOWN, July 31.—The new modern blast furnace of the Republic Iron & Steel Co., listed as No. 5 of the Haselton group, was put into commission Monday, July 30, and operated splendidly on its first cast. With five modern blast furnaces at Haselton, the Republic will be in better shape to take care of its metal needs required by additional open hearth furnaces and its Bessemer mill. Besides its Haselton group of smelters, the company operates the Hannah Furnace at the old Mahoning Valley works in Youngstown and the Atlantic stack in New Castle.

Stone & Webster have been awarded the contract for the grading of the new 300-acre industrial town site of the Youngstown Sheet & Tube Co. Work will be commenced this week. This plot is located at Lansingville, opposite East Youngstown, Ohio. This same construction company has the contract for grading and paving and leveling of the McDonald town site being promoted by the Carnegie Steel Co. at McDonald, located between Girard and Niles, Ohio.

Following the decision reached by the management of the Pennsylvania Railroad last spring, to open avenues of employment for women and girls, in as many lines of work as possible, more than 2000 have entered the service of the lines east of Pittsburgh and Erie, in the operating department alone. The total number of girls and women at present working in the operating department is 2360, and the greater part of these have been employed in the last two months.

## WORKMEN'S LEGAL RIGHTS

### Some Recent Judicial Determinations on Duties Arising Under Employment Relationships

By A. L. H. STREET

*Suing Employee Must Prove Negligence.*—Since negligence of an employer is not to be presumed from the mere fact that a workman is injured in the course of his work, so as to make the employer liable in damages, a laborer whose toe was amputated by a falling freight elevator when caught between the edge of the car and the adjacent floor is not entitled to recover against the iron works company by which he was employed, in the absence of proof as to how the accident occurred and that the employer was negligent in some specific respect. (Louisiana Supreme Court, June 11, 1917. *Franklin vs. W. K. Henderson Iron Works & Supply Co.*, 75 Southern Reporter, 661.)

*Risks Assumed by Employees.*—Where an employee, directed to move a heavy iron flange, knew its weight, through having previously carried it without any such direction, he cannot recover for injuries resulting from his attempt to carry it in obedience to instructions, on a theory that his employer was negligent in giving the instructions. The injured man is presumed to have known his own strength. (Kentucky Court of Appeals, May 29, 1917. *Strong vs. Cumberland Pipe Line Co.*, 194 Southwestern Reporter, 1036.) That an employee assisting in carrying a boiler plate in boiler shops stumbled over a truck does not make the employer liable for resulting injury, the truck having been left in a space used promiscuously by other employees, and not in any regular passageway, and it appearing that the injured man had as full opportunity as any one else to know of the presence of the truck. (Kansas City Court of Appeals, May 21, 1917. *Phipps vs. Prior*, 195 Southwestern Reporter, 532.)

*Injuries Sustained in Doing Unauthorized Work.*—There is a rule of law that an employer is not responsible for injuries sustained by a workman while doing some act beyond the duties of his employment, especially when it appears that the workman had been previously instructed not to do that act. This rule is applied to the case of an operator of a buffing machine, to which was attached an exhaust machine designed to carry away the dust generated in the process of the work. He was distinctly instructed that if anything went wrong with the exhaust system, he should call a certain other employee whose duty it was to attend to the matter. Nevertheless, when a metal piece fell into the exhaust apparatus, he took off a cover of the apparatus and put his hand down into it to recover the piece, resulting in his hand being injured by the exhaust fan. Under such circumstances, it is held that the act causing the injury was so foreign to his employment duties as to deprive him of any right to recover an award under the Illinois workmen's compensation act. (Illinois Supreme Court, June 21, 1917. *Eugene Dietzen Co. vs. Industrial Board of Illinois*, 116 Northeastern Reporter.)

*Employer's Duty to Safeguard Machinery.*—In upholding liability of a manufacturing company for injury to a blacksmith shop employee, received through bursting of an emery wheel which he was operating in grinding iron parts, it is decided that where an employer violates the Indiana factory act, by failing to place guards upon dangerous machines when practicable, an employee cannot be deemed to have assumed the risk of consequent injury. To render the employee liable in a case of this kind, it is not necessary to show that he should have foreseen occurrence of the particular accident; it being sufficient that he should have foreseen that some injury might result from failure to install a guard which would have avoided the accident. (Indiana Appellate Court, May 11, 1917. *Brown vs. Illinois Car & Mfg. Company*, 116 Northeastern Reporter, 4.) And, under the Wisconsin Workmen's Compensation Act, an employer operating a traveling crane in his manufacturing plant is liable to pay an increased award for injury to or death of

an employee, resulting from the failure of the employer to guard the wheels of the crane, as required by law, in the absence of proof that willful failure of the employee to exercise ordinary care for his own safety was the direct cause of the accident. (Wisconsin Supreme Court, May 15, 1917. *Manitowoc Boiler Works vs. Industrial Commission of Wisconsin*, 163 Northwestern Reporter, 172.) The Pennsylvania statute which requires set screws on machinery to be safeguarded applies to stationary, as well as revolving, set screws. (Pennsylvania Supreme Court, Feb. 12, 1917. *Hogarth vs. William H. Grundy & Co.*, 100 Atlantic Reporter, 1001.)

*Duty to Furnish Safe Appliances.*—An employer is liable for injury sustained by an employee through breaking of a defective rope furnished him by a foreman, where the latter refused permission to use a new rope which was available. The fact that the employer had provided a new rope did not exonerate him from liability where the injured man was permitted to use it only on obtaining the consent of his foreman. (United States Circuit Court of Appeals, Eighth Circuit, April 3, 1917. *Mardis vs. Miller*, 241 Federal Reporter, 470.)

*Workmen's Compensation Act Awards.*—When it appears that since making of an award under the New Jersey workmen's compensation act in favor of an injured employee that his earning capacity has increased, the employer is entitled to have the award decreased; the basic principle of the act being indemnity against loss of earning power by reason of accidents sustained in the course of employment. (New Jersey Supreme Court, April 7, 1917. *Safety Insulated Wire & Cable Co. vs. Court of Common Pleas for Hudson county*, 100 Atlantic Reporter, 846.) But the fact that an injured man is able to secure new employment even more remunerative than the work in the course of which he was injured does not deprive him of the right to an award under the Kansas workmen's compensation act. (Kansas Supreme Court, May 12, 1917. *Sauvain vs. Battelle*, 164 Pacific Reporter, 1086.)

*Strike Injunction Not Violated.*—Where a foundry company operating an open shop obtained an injunction against striking employees, restraining them from doing certain things, including "addressing" the company's employees as scabs, there was no violation of the injunction by publishing a notice in a newspaper, addressed to the strikers to encourage them to refrain from returning to work, and referring to the men working for the company as scabs; it appearing that the injunction was merely intended to prevent strikers from annoying the company's employees and provoking them to breaches of the peace by calling them scabs in their presence. Nor was the newspaper notice objectionable in so far as it asked the public to remain away from the company's plant. (Illinois Supreme Court, June 21, 1917. *Illinois Malleable Iron Co. vs. Michalek et al.*, 116 Northeastern Reporter, 714.)

Sir James Loughheed, replying to Hon. Mr. Casgrain in the Canadian Senate as to the situation regarding rails for military and other purposes, stated that the Algoma Steel Co. had been under contract since July, 1916, to roll rails for 92 miles of roads for the Hudson Bay line, but that it was doubtful whether the company could secure the steel to do so owing to the fact that the Imperial Munitions Board was taking supplies for the manufacture of munitions.

Dupont, Roy & Baudouin, Montreal, have prepared plans for a mechanical gravity filtration plant for Dorval, Que. At present there is a plant for pumping water from the St. Lawrence River. It is now proposed to construct a filtration plant which will have a capacity of 500 gallons per minute.

A plan has been filed by the American Machine Co. of Brooklyn for the construction of a 5-story concrete factory building, 185 x 100 ft. The building will cost about \$250,000 and will be an addition to the main plant of the firm.



## NEW TRADE PUBLICATIONS

**Gage Grinding Machine.**—Steel Products Engineering Co., Springfield, Ohio. Folder. Illustrations and descriptive matter explain the operation of a universal grinding machine for gages which was illustrated in *THE IRON AGE* Feb. 8, 1917. Among the special advantages claimed for the machine are the elimination of practically all stoning or lapping, ease of adjustment and operation and the elimination of resetting for each piece of work. The grinding wheel spindle is of a special type arranged to overcome the jerk of the driving belt and a sectional view shows how this is accomplished. A condensed table of specifications supplements the text description and the illustrations.

**Sand Blast Barrel.**—New Haven Sand Blast Co., New Haven, Conn. Circular. Presents a partial list of users of a self-contained sand blast barrel for gray and malleable iron and brass castings, forgings and special work. Where more than one barrel is in use at any of the plants the exact number is given.

**Saws.**—Henry Disston & Sons, Inc., Philadelphia. Vol. 1, No. 1, of "Disston Bits." Is a monthly house organ for distribution among the employees of the company. The new magazine will not conflict in any way with the "Disston Crucible," the trade organ which the company has issued for several years. The several departments usually found in house organs of this nature, such as editorial, sports, safety first, etc., are all represented and all of the illustrations, cartoons and editorial matter are the work of the employees themselves. The name of the new organ is significant, as the teeth of inserted saws, one of the company's products, are also called "bits."

**Pipe Threading Machines.**—Landis Machine Co., Waynesboro, Pa. Catalog No. 23. Calls attention to a line of pipe threading and cutting and pipe and nipple threading machines with the die heads used with each and a machine for grinding the chasers. The various heads are described at some length and specification tables and clearance diagrams and tables are included. The different machines are briefly described, a separate page being given to each. Lists of repair parts and a telegraph code are included.

**All Metal Swing and Flexible Pipe Joints.**—Rostern Co., Peoples' Gas Building, Chicago. Folder. Describes a new swing and flexible pipe joint suitable for steam, water, gas or oil lines in which all packing has been eliminated.

**Air Compressors.**—Eagle Corliss Engine Works, Erie, Pa. Bulletin No. 27. Calls attention to a line of belt and steam driven power air compressors which are built in sizes ranging from 3 to 8000 cu. ft. of air. A general description of the construction of the compressors, which is supplemented by illustrations of the different parts, is presented and this is followed by specification tables of the various sizes of compressor that can be supplied. Mention is also made of a line of air receivers and views of the different types of air compressors built are included.

**High Resistance Pyrometers.**—Hoskins Mfg. Co., Detroit. Bulletin No. 3-A. Illustrates and describes a line of high resistance thermo-electric pyrometers of the wall, portable and recording types. The construction of the thermocouples and the meters used in connection with the pyrometers is gone into at some length. Wiring diagrams are included and mention is made of accessories, such as protecting tubes for the thermo-couples, selective switches, inclosing cabinets, etc.

**Ball Bearings.**—Norma Co. of America, 1790 Broadway, New York. Folder. Points out the part being played by the company's ball bearings in the service of the Government on land, at sea and in the air, with particular reference to their use in magnetos and lighting generators. The importance of having a sure source of supply of ignition current is emphasized in every case.

**Steel Wheels.**—Ackerman Wheel Co., Rockefeller Building, Cleveland. Circular. Refers to a special type of metal wheel which was illustrated in *THE IRON AGE*, Jan. 25, 1917. The distinguishing feature of this wheel is the use of a spoke made of strip steel. These spokes are elliptical in outline and are relied upon to absorb the shocks imparted to the outer edge of the wheel. A number of views of the various forms of wheels made are included.

**Nut Locks.**—F. R. Blair & Co., 50 Church Street, New York. Leaflet. Deals with a nut lock which was illustrated in *THE IRON AGE*, Feb. 15, 1917. The essential features of the lock are a washer with a toothed surface and a plain square one that is bent up at one corner after the nut has been tightened. Illustrations showing the various portions of the

lock separately and assembled are included, together with a table giving the sizes of bolts for which the lock can be supplied.

**Watthour Meters.**—General Electric Co., Schenectady, N. Y. Bulletin No. 46,209. Gives illustrations and a general description of two types of watthour meters for measuring direct current installations of relatively large size. One type is intended for switchboard work and the other for installations where front connections can be employed. Full information regarding the construction of the meters and their dimensions, as well as connection diagrams, is included.

**Open-Hearth Charging Machine.**—Edgar E. Brosius, Pittsburgh. Bulletin No. 10. Describes a single hoist charging machine for foundry cupolas and open-hearth steel furnaces and for use in the stock yard. Among the advantages claimed for the machine, which was illustrated in *THE IRON AGE*, May 24, 1917, are simplicity of construction and low first cost.

**Vent and Leader Connections.**—Barrett Co., New York. Two pamphlets. Concerned with the Holt line of vent and leader roof connections for use on any kind of flat or nearly flat roof construction or for flashing around fixtures passing through the roof. The different types of connections are illustrated and briefly described and tables of the various sizes of each that can be supplied are included.

**Monel Metal.**—Electrical Alloy Co., Morristown, N. J. Folder. Relates to a brand of Monel metal which is furnished in wire, ribbon, strips, rods and special shapes. The properties of the metal are briefly touched upon and mention is made of the various forms in which it can be supplied. A partial list of the uses to which the metal is put is given, together with one of the resistance materials made.

**Toolroom Lathe.**—Master Machine Tool Co., 110 West Fortieth Street, New York. Circular. Treats of a 12-in. lathe for toolroom and manufacturing work. The description is concise and the various parts are each given a separate paragraph with a sidehead in contrasting type. The text matter is supplemented by an illustration of the lathe and a condensed table of specifications. An illustrated description of the lathe appeared in *THE IRON AGE*, Feb. 15, 1917.

**Speed Lathe.**—Oliver Machinery Co., Grand Rapids, Mich. Circular. Treats of a 12-in. speed lathe arranged for either belt or motor drive. The construction of the lathe is gone into at some length, special emphasis being laid upon a four-step cone pulley, the use of white bronze removable ring-oiling bearings, a hand feeding carriage with compound swivel rest and a set-over tailstock. The text is supplemented by illustrations of the different parts and a brief code for ordering the lathe and the various accessories that are supplied is given. An illustrated description of the lathe appeared in *THE IRON AGE*, Feb. 1, 1917.

**Sheet Metal Testing Device.**—Pittsburgh Instrument & Machine Co., 101 Water Street, Pittsburgh. Pamphlet. Mentions a device for determining the drawing, stamping, compressive and folding qualities of sheets of iron, steel, brass, copper, gold, silver and other metals. A description of the device is presented and instructions for the making of the tests are included.

**Metals.**—Ellsworth Haring, 114 Liberty Street, New York. Three leaflets. Call attention to a line of high speed and tool steels, steel and brass balls and mechanical and steel specialties. These include spark plug wire, ignition metal, tungsten, German silver, zinc, phosphor bronze, brass and copper in a variety of shapes, special steel balls, etc. Brief statements indicating the extent of each line are given.

**Hoisting Machinery.**—Shepard Electric Crane & Hoist Co., Montour Falls, N. Y. Handbook. Presents in clear and exact form such data relative to hoisting machinery as will enable engineers and managers to consider the application of hoisting and conveying units. A brief description of the construction is presented, followed by numerous dimension diagrams and tables.

**Rubber Belting.**—B. F. Goodrich Co., Akron, Ohio. Pamphlet. Gives brief descriptions of the various brands of belting that can be supplied, the text being supplemented by numerous illustrations of the belts in use. Instructions on the installation and care of belts are presented, together with a number of tables of useful information.

**Wire Fibrous Belting.**—Wire-Fibrous Belting Corporation, Pallsade Avenue, Englewood, N. J. Pamphlet. Relates to a special type of belting which is made out of spun fibrous yarn which has an untwisted steel wire center, the yarn being twisted into strands which are again woven into belting and impregnated with a dressing. An account of the development of belting from prehistoric times to the present is given, the text being supplemented by numerous illustrations. The advantages claimed for this type of belt, which include great strength, transmission of more power and freedom from stretching or contraction, are briefly touched upon.

# The Role of Chrome Vanadium in Steel

## Its Position Among Alloy Steels—Wide Temperature Limits for Heat Treatment—Its Uses, Composition and Structure

—BY F. J. GRIFFITHS—

CHROME-VANADIUM steel holds the position virtually at the head of the commercial alloy steels and owes this prestige to the extremely wide range of physical qualities which are capable of being developed from this metal by proper methods of heat treatment. Like all alloy steels it is, as its earlier name signifies, a special steel, meaning not only that it is designed for special purposes, but also, that its preparation for the particular work it is called upon to perform must be carried out along certain lines calculated to yield in the final result, those qualities which shall represent 100 per cent efficiency in the final product. Many specifications to-day allow a variation of 1 or 2 per cent in the elongation, and restrict also the ultimate strength and yield point to extremely narrow limits. Examination of these specifications alone would serve to show the wide range of qualities of chrome-vanadium steel, and the absolute delicate accuracy with which by proper management it may be put into condition to perform its highest functions.

### Its Composition and Structure

Chrome vanadium combines in such a manner with iron, that the separate constituents of the final alloy produced cannot be distinguished, regardless of the methods selected to separate them. Whether we adopt mechanical means or use the microscope under large magnification the result is the same. This phenomenon indicates a quite strong combination between the alloying elements and defines the combination unmistakably.

Until recently little investigation has been ventured to ascertain the definite properties of chrome vanadium, and the advantages secured by this alloying element were relatively unknown except to a favorite few who, through their own research work, acquired intimate knowledge of the characteristics bestowed upon iron by the addition of this alloy.

Chrome vanadium alloys with iron in all proportions and affects the properties to a marked degree, depending upon the percentage of chrome vanadium present. The qualities which become inherent are influenced also more or less proportionately by the amount of carbon contained. In this respect chrome-vanadium steel is a special steel in another sense of the word and cannot be judged by the same standard as the old carbon steels.

The point of view of the examiner of the old commercial steel is always that of the actual condition in which the metal exists as he sees it before him, and governed by the amount of carbon present. But this point of view has altered gradually until with chrome-vanadium steel the carbon range permissible to obtain specific characteristics has become narrowed. The presence of chrome vanadium in steel intensifies the effect of the carbon in all the best qualities, which it is capable of producing alone.

The property of soundness of the casting and ingots, produced by the use of chrome vanadium, induces freedom from occluded gases and greatly increases the desirable physical qualities of the forgings subsequently made from this steel, such as strength, ductility and resilience. These desirable properties are amply proved not only from the results obtained from tests, but also from the more vital trial of actual use.

### Value of Special Steels

According to the old view and judging from the results of tests chrome-vanadium steel, as rolled or

annealed, may appear to be a worthless product. It may have, as in examples to be given later, a percentage of elongation, reduction of area, elastic limit and ultimate strength corresponding to simple carbon steel. Stress is laid on this particularly, because there is still a large and unreasonable prejudice in certain quarters against the use of steels which have to be put in special condition, or more plainly, heat treated, before they are capable of doing their best work. Of course, as we all know, this feeling is largely giving way before the splendid performance which steels of this character are giving in service, and given sufficient time, the special steels themselves will demonstrate the unsoundness of this objection, based largely upon the limitations of the older simple carbon steels.

In order to make this more definite the subjoined tests, which are in no sense exceptional, are offered. They have been selected almost at random from records for the purpose of illustration. They cover briefly four classes of chrome-vanadium steel, as follows:

A steel with a composition of about 0.31 per cent of carbon, 0.95 per cent of chromium and 0.14 per cent of vanadium.

A steel of 0.42 to 0.49 per cent of carbon, approximately 1.10 per cent of chromium, and 0.15 per cent of vanadium.

High carbon chrome-vanadium steel of a composition of 0.98 per cent of carbon and 1.06 per cent of chromium and 0.12 per cent of vanadium, and

Low-carbon chrome-vanadium steel of an analysis suitable for most structural purposes, namely, carbon, 0.24 per cent; manganese, 0.69 per cent; chrome, 1.10 per cent, and vanadium, 0.15 per cent. It is to be regretted that while we are engaged on extensive tests of the third class of material mentioned, our experimental data are not at present available for use here. However, the extreme softness and ductility of this steel in the annealed condition may be noted from the one example given. This result is rather surprising in view of the high-carbon content present. Table 1 gives results of tests on these steels.

An examination of these results, which are concerned only with the simplest quenching and drawing treatments, shows the versatility of chrome-vanadium steel. One comment, however, based upon a practical consideration and not upon theory, may well be made here. Test results such as these just presented are valuable only in so far as they are recognized for what they are. They represent, it is true, what it is possible to do with the metal when it is in the finished state, but they do not necessarily represent what the qualities of the metal in the final product will be, if the heat treatment is carried on under exactly the same conditions as those which obtain in the tests. When it comes to question of heat treatment of the final product, the conditions must of necessity be altered somewhat, and the treatment of each class of articles then becomes a special problem. This should not be considered in the light of admission on the part of the steel manufacturer; it should be rather conceded as the principle by which he is most willing to work.

One of the principal effects produced in steel by the addition of chrome vanadium, is to raise the temperature at which the carbides dissolve in the iron, and the temperature at which they are precipitated out of solution. This elevation of the solution temperature is quite noticeable, the carbon content affecting this temperature but slightly. When chrome vanadium is added to steel, it raises the critical points on heating above the corresponding carbon-steel temperatures, but on cooling the critical point is considerably depressed, roughly in proportion to the maximum temperature from which the steel is cooled. The higher the maximum temperature reached the lower the critical range will be on cooling. This fact serves to show the slowness with which the structural changes occur in this alloy and the additional

\*From a paper presented at the twentieth annual meeting of the American Society for Testing Materials at Atlantic City, June 27, 1917. The author is second vice-president and general superintendent, Central Steel Company, Massillon, Ohio.



time required for the transformation to be effected completely.

Wide Temperature Limits for Treatment

It is unnecessary to point out the practical utility in commercial practice of working with a steel, in which this slow rate of transformation can be taken ad-

Table 1.—Physical Properties of Steels of Various Chemical Compositions

Elastic Limit, lb. per sq. in.	Tensile Strength, lb. per sq. in.	Elongation in 2 in., per cent	Reduction of Area, per cent	Brinell Hard- ness Number	Drawing Tem- perature, Deg. Cent.	Remarks
0.31 per cent Carbon Chrome-Vanadium Steel						
238 000	255 000	6.5	25.0	444	200	Heated to 850° C. Cooled to 800° C., quenched in water. Reheated to 850° C. for 20 min., and cooled in air.
220 000	232 000	10.5	49.0	444	260	
178 000	193 000	11.0	50.0	444	375	
170 000	179 000	12.5	55.0	387	430	
153 000	166 000	15.0	58.0	364	485	
149 000	160 000	16.0	59.0	351	540	
130 000	146 000	17.0	60.5	340	595	
0.42 to 0.49 per cent Carbon Chrome-Vanadium Steel						
225 000	234 000	6.0	14.0	321	200	Heated to 850° C. Cooled to 800° C., quenched in oil. Reheated to 850° C. for 20 min., and cooled in air.
212 000	223 000	7.5	16.0	321	260	
205 000	212 000	8.5	41.0	321	320	
167 000	175 000	11.5	52.0	321	430	
148 000	159 000	13.0	55.0	303	485	
141 000	151 000	15.0	60.0	286	545	
130 000	144 000	16.5	62.0	269	595	
High-Carbon High-Chrome Steel						
100 000	120 000	22.0	62.0	260	700	Heated to 875° C. Cooled to 825° C., quenched in oil. Reheated to 875° C. for 20 min., and cooled in air.
116 000	131 000	19.0	58.0	286	656	
155 000	170 000	15.0	45.0	387	650	
173 000	185 000	12.0	40.0	418	580	
167 000	179 000	12.0	35.0	418	540	Heated to 900° C. Cooled to 825° C., quenched in oil. Reheated to 900° C. for 20 min., and cooled in air.
182 000	188 000	11.0	32.0	444	485	
202 000	216 000	10.0	31.0	477	430	
220 000	228 000	9.5	30.0	555	375	
122 000	142 000	16.0	55.0	321	...	As rolled.
97 000	136 000	19.0	60.0	321	...	As rolled.
Low-Carbon Chrome-Vanadium Steel						
43 200	92 450	32.0	64.0	170	...	Annealed.
High-Carbon High-Chrome Steel						
194 000	209 000	12.0	51.0	444	200	Heated to 850° C. Cooled very slowly to 800° C., que'h'd in water. Reheated to 850° C. for 20 min., and cooled in air.
197 000	206 000	11.1	53.0	444	260	
182 000	198 000	10.0	53.0	444	320	
166 000	179 000	13.0	57.0	402	375	
161 000	169 000	15.0	58.0	387	430	
148 000	157 000	16.0	59.0	364	485	
144 000	155 000	18.0	60.0	340	540	Heated to 850° C. Cooled very slowly to 800° C., que'h'd in water. Reheated to 850° C. for 20 min., and cooled in air.
130 000	142 000	20.0	63.0	332	595	
158 000	162 000	14.0	57.0	364	420	
142 000	150 000	15.0	61.0	340	485	
135 000	146 000	16.0	62.0	321	540	
128 000	139 000	19.0	64.0	302	605	

vantage of by the use of higher temperatures without resulting injury to the product, and also by the fact that the steel can stand exposure at these higher temperatures without the attendant harmful effects characteristic of other steels subjected to the same conditions. In fact, chrome vanadium seems to attain its greatest combination of desirable qualities at higher treatment temperatures than would be expected from the location of its critical range, due principally to the greater length of time necessary to effect the complete transformation of its constituents into a uniform and homogeneous solid solution. This point is emphasized because certain other commercial alloy steels, although excellent in many respects, have very narrow limits of annealing and hardening temperatures, and therefore require unusual care in their treatment, a slight deviation from the correct temperatures resulting unsatisfactorily.

A single quenching and drawing treatment, as we have seen from the tests, is sufficient for general purposes to effect complete refinement and hardening of chrome-vanadium steel. This characteristic of simplicity in treatment obviously insures a high-grade

product under ordinary commercial conditions, and when compared with the double and triple heat treatments required for the refinement of other alloy steels, the economy presented is obvious. These properties, possessed only by the chrome-vanadium alloy, characterize this steel as a material universally applicable for any commercial requirement. They also simplify the treating instructions necessary to successfully handle alloy steel of this chemical composition. One heat-treating specification is adaptable for any carbon analysis, whether the steel is destined for case-hardening purposes or for oil-treating for gears and cones, etc. It has been found by experience that a temperature of 775 deg. C., which is suitable for hardening a case-hardening steel and still retain desirable toughness of the core, can also be employed for hardening oil-treated parts.

The lower-carbon chrome-vanadium steels are apparently pearlitic in nature and, as such, possess the increased strength and hardness resulting from the effect of the special elements, in producing a ferrite of superior strength, subsequently resulting in a more dense and improved pearlite. With the increase in the carbon and alloy contents, this steel becomes more or less cementitic and it is probably this quality which demands the use of higher temperatures than usual in treatment in order to produce complete absorption of its component parts.

The quality of chrome-vanadium steel often described as "tough hardness" is one of its especially desirable properties, and is due probably to the somewhat finer and denser structure of the microscopic constituents, and to their more uniform distribution. This effect is obtained not only through the actual influence of the chromium and vanadium as component parts of the alloy, but also to the influence of the combination of both of these elements in producing in the molten metal a condition of purity and freedom from gases, and, therefore, subsequently forming a metal which, at the time when the structural changes occur, is in the best possible condition for these changes to take place, that is, in the highest form in which the alloy composition renders it possible.

Adaptability of Chrome-Vanadium Steel

From conclusive tests, chrome-vanadium steel can be described as a universal steel. With the carbon present in variable amounts, almost any physical property desired can be secured. It is adaptable for case hardening where the carbon should not exceed 0.20 per cent, that is, for axle shafts, etc., where nominal strength is essential; for oil-treated gears and vanadium springs, where great resilience and resistance to repeated shock is required; for dies, where surface hardness and toughness must both be present; for drills, etc., where wear-resisting qualities and lack of

Table 2.—Results of Tests on Chrome-Vanadium Steels of a Large Automobile Maker

Specimen No.	Elastic Limit, lb. per sq. in.	Tensile Strength, lb. per sq. in.	Elongation in 2 in., Per Cent	Reduction of Area, Per Cent	Brinell Hardness No.
1.....	162 820	172 850	14	49.7	418
2.....	160 130	172 090	14	49.5	418
3.....	160 840	172 090	15	49.9	387
4.....	159 520	171 630	14.5	46.9	376
5.....	154 480	164 760	14	52.4	364
6.....	151 000	162 240	14	55.7	364
7.....	154 570	165 160	15	52.3	364
8.....	153 920	163 590	15	54.0	351
9.....	146 590	162 790	15	55.6	340
10.....	146 700	156 360	15	55.7	340
11.....	146 080	157 790	15.5	55.3	321
12.....	148 620	158 090	15.5	55.8	332

potential brittleness is necessary; for cones and raceways of bearings, which must possess a glass-hard surface, accompanied with proportionate toughness to prevent checking and cracking under the stresses imposed.

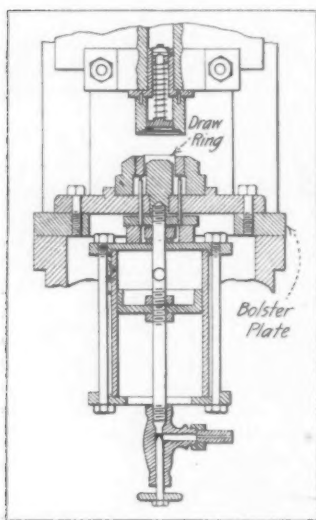
The adaptability of chrome-vanadium steel is general, and where strength and hardness and resistance to fatigue properties are the prerequisite, there is a chrome-vanadium steel for the purpose. When the steel is case hardened, a glass-hard surface and tough fibrous core is easily obtained. These properties are obtained without complex treatment, consisting of

simple quenching, with reheating and quenching. For other heat-treated parts, a simple heating, quenching and drawing give a steel, relatively so tough and strong that it is unlike any other hardening alloy steel. Chrome-vanadium steel is a universal alloy steel and stands forth unmistakably as the master alloy.

Table 2 gives results of tests made by a large automobile manufacturer using chrome-vanadium steel for principal parts. The tests given represent those made from 0.30 to 0.40 per cent carbon chrome-vanadium steel used for axle shafts, and demonstrate results that are secured from routine practice. The uniform strength exhibited supplies incontestable testimony of the dependable qualities inherent in this analysis steel when treated in commercial quantities.

### A Pneumatic Die Cushion for Presses

The Strand pneumatic die cushion, a substitute for rubber bumpers or steel springs to regulate the pressure on the draw ring of stamping presses, is manufactured



The Pneumatic Die Cushion Is Screwed into the Die like Any Ordinary Rubber Bumper and the Air Pressure on the Draw Plate Is Adjusted to Suit the Conditions of Each Particular Job, Although in Some Cases the Cushion Is Attached Permanently to the Bumper Plate

like any rubber press bumper of the ordinary type.

The air cylinder is fitted with a piston carried on a single rod, the latter having at one end a standard thread which screws into the die or bolster plate. In the ordinary type of Strand cushion the cylinder and not the piston moves, although in one design the cylinder is stationary and the piston is actuated by the air. It may be remarked that the cushion is used exactly in the same manner as a rubber bumper, or coiled spring, and that no special attachments are required. As the air is admitted to the cylinder of the cushion, its pressure is exerted on the pins of the draw ring which rest on the top of the cylinder. Therefore, as the press descends, the pins are pushed downward, causing the cylinder to recede as the air within it is forced back into the supply tank, the resistance meanwhile being uniform because of the fact that the expelled air is distributed over the larger space of the air reservoir.

The compressed air tank is fitted with blow-off and regulating valves. The reduction valve regulating the pressure for an individual machine is adjusted to meet the needs of each job, and the importance is pointed out of keeping memoranda of pressures required to save time in setting up for subsequent operations. In connecting the cushion with the pipe supplying air, either hose or gas pipe may be used. The main tank should be pumped up to the maximum pressure used in the shop, and the blow-off valve adjusted for safety.

The cylinders of the Strand cushion are made of steel tubing, bored and ground. The other parts are steel forgings. The rods are ground also. The cushions

by the Strand Machinery Co., 825 Washington Boulevard, Chicago, to which patent claims have been allowed in full. With the device some unusual results, it is stated, have been obtained, particularly in the direction of drawing, at one operation, cylindrical or oval shapes without scratching or wrinkling, in which the depth is considerably greater than the diameter. Not only does the cushion obviate excessive or insufficient gripping by the draw ring, but it makes simple the regulation of the pressure, insures a uniform grip of the blank throughout the operation of forming, and does this despite any lack of uniformity in thickness of the metal being worked. It is fastened in position

are made in various sizes up to 12 in. in diameter. On a 6-in. cushion a maximum stroke of  $3\frac{1}{2}$  in. is obtainable, and on a 12-in. cushion,  $8\frac{1}{2}$  in. On large presses it has been found advantageous to place four, or even six, cushions, and this, it is explained, can be done with certainty that the pressure will be uniform on every part of the draw plate, because all cushions are fed from one source of air supply. In several cases where the Strand cushion has been used on double-action presses it has been found feasible to eliminate the cam movement inasmuch as the cushion permits greater speed of operation. It has been definitely proved that with the device shapes can be formed at one draw that are deeper than the diameter, one such example being an oil can  $2\frac{7}{8}$  in. in diameter and  $3\frac{3}{8}$  in. in depth. Automobile headlights are made at one draw, and so successfully that buffing operations are dispensed with inasmuch as scratches on the work are eliminated.

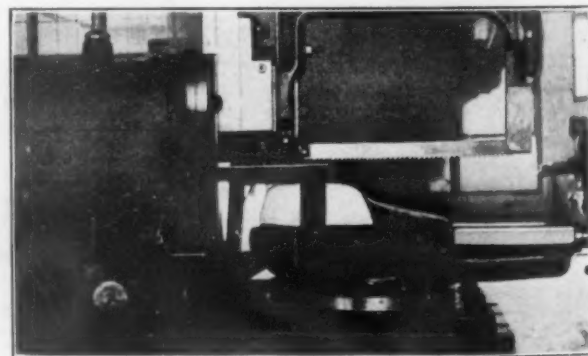
The makers emphasize that the use of the cushion eliminates the back-kick which results from the use of rubber bumpers or steel springs due to their great compression at the end of the stroke. Not only is the back-kick a source of strain on the clutch, but it also causes a waste of power and shortens the life of the press. The well-known deterioration of rubber when in contact with oil also is pointed out.

### Saw Attachment for Shaping Machines

J. A. Moller, New Rochelle, N. Y., has developed a saw attachment for shaping machines which is designed for use in connection with the manufacture of dies, gages, jigs, fixtures, tools, etc. Among the advantages claimed for the combination are the clamping of the stock positively in the vise of the shaping machine and the positive control provided for the saw when attached to the shaper ram, as well as the ability to adjust the blade in all directions.

The frame of the saw is cast in two parts, the connection between the two being made by screws which serve to tighten the blade and at the same time are relied upon to give a slight oscillating motion and thus prevent the blade from breaking. The distance from the cutting edge of the saw blade to the underside of the frame is 9 in., thus permitting stock of that dimension to be handled.

The frame is fastened to the ram by a block which enters into an oblong slot in the frame. This arrangement tends to prevent the frame from turning around



The Use of a Saw Attachment in Connection with a Shaping Machine Is Relied Upon to Facilitate the Production of Dies, Jigs and Fixtures

when tightened and the slots enable the frame to be raised or lowered 5 in. Means are provided to relieve the saw on the return stroke.

Wages of machinists, boilermakers, blacksmiths and pipe fitters at the Monon railroad shops, Lafayette, Ind., have been advanced 7c. an hour and the helpers and apprentices 5c. an hour.

An aviation school under the direction of the Aviation Section of the United States Signal Corps is expected to be established about Sept. 1 at the Johns Hopkins University, Baltimore.



Ferromanganese Supplies Are Still Diminishing

Receipts of ferromanganese from Great Britain in May and June have shown a decided falling off from previous months and the situation as to supplies is thus less reassuring. The following table presents the situation as it stands up to the present time, giving the official imports and the domestic production of the alloy from the blast furnace reports of THE IRON AGE in gross tons:

	Imports	Domestic Output	Available Supply
Average per month, 1916..	7,577	18,461	26,038
January, 1917 .....	6,211	21,130	27,341
February .....	6,379	19,942	26,321
March .....	5,324	18,529	23,853
April .....	6,846	17,989	24,835
May .....	2,019	20,722	22,739
June .....	2,717	21,041	23,758

This shows that the available supply has been diminishing in the last few months, particularly in the last two. The average output of domestic alloy has been 19,892 tons per month for the first half of this year while the average imports have been only 4916 tons per month.

STEEL CORPORATION EARNINGS

Good Showing After Large Deductions for Taxes—Special Dividend

The report of the United States Steel Corporation for the second quarter of this year shows a continuation of great earnings, which would have surpassed those of any other quarter by about \$30,000,000 had it not been for the deductions made for war income and excess profit taxes. The earnings, after making the usual deductions for operations, ordinary repairs and maintenance and war taxes of \$53,918,872 were \$90,579,204. The earnings for the past 10 quarters have been as follows:

	1917	1916	1915
First quarter .....	\$113,121,018	\$60,713,624	\$12,457,809
Second quarter .....	90,579,204	81,126,048	27,950,056
Third quarter .....		85,817,067	38,710,844
Fourth quarter .....		105,968,347	51,232,788

From the \$90,579,204 the usual dividends of 1¼ per cent on the preferred and 1¼ per cent on common, amounting to \$12,658,700, and an extra dividend of 3 per cent on common, amounting to \$15,249,075, were deducted, making a deduction of \$27,907,775 for divi-

United States Steel Corporation Earnings for the Quarter Ending June 30th, 1917

	1917	1916
April .....	\$28,521,091	\$25,423,676
May .....	30,773,551	27,554,899
June .....	31,284,562	28,147,473
Total earnings after deducting all expenses incident to operations, comprising those for ordinary repairs and maintenance of plants, taxes (including an allowance of \$53,918,872 (estimated) for war income and excess profits taxes) and also interest on bonds of the subsidiary companies.....		
Less, charges and allowances for depreciation, applied as follows, viz:	\$90,579,204	\$81,126,048
To depreciation and extraordinary replacement funds and sinking funds on bonds of subsidiary companies.....	\$14,347,399	
To sinking funds on U. S. Steel Corporation bonds.....	1,806,752	
	\$16,154,151	\$8,071,848
Net income.....	\$74,425,053	\$73,054,200
Deduct: Interest for the quarter on U. S. Steel Corporation bonds outstanding.....	\$5,326,907	
Premium on bonds redeemed.....	224,610	
	5,551,517	\$5,412,962
Balance .....	\$68,873,536	\$67,641,238
Dividends on stocks of the United States Steel Corporation, viz.:		
Preferred, 1¼ per cent.....	\$6,304,919	\$6,304,919
Common, 1¼ per cent.....	6,353,781	6,353,781
	\$12,658,700	
Extra dividend:		
Common, 3 per cent.....	15,249,075	5,083,025
Balance of surplus for the quarter.....	27,907,775	
Net surplus reported for quarter ending March 31, 1917.....	\$69,836,981	\$40,965,761
Less:		
Special extra common dividend, No. 51, paid July 28, 1917 .....	\$5,083,025	
Additional allowances estimated for first quarter of 1917, for war income tax and excess profits tax (per H. R. Bill 4280, reported to U. S. Senate, July 3, 1917, not yet finally adopted).....	33,865,000	
	38,948,025	
Balance of surplus for quarter ending March 31, 1917.....	30,888,956	
Total surplus for six months ending June 30, 1917.....	\$71,854,717	\$47,964,535

About two months ago the Alloy Committee of the Council of National Defense, after a thorough canvass of the situation, made the statement that the consumption of ferromanganese of the steel industry of the United States was about 28,000 tons per month. With production close to 20,000 to 21,000 tons and with imports at that time of about 6000 tons per month, the available supply seemed somewhere near being adequate. But with imports declining as decidedly as they have and bid fair to, taking into account submarine sinkings already reported, the outlook is not as promising as could be wished.

There has also been a falling off in the domestic output of spiegeleisen. The June production was only 9425 gross tons as compared with an average of 18,049 tons per month for the first five months of this year.

dends and leaving a surplus for the quarter of \$40,965,761. From the net surplus for the first quarter, \$69,836,981, deductions for the special extra common dividend, \$5,083,025 (Red Cross), and additional taxes under the bill now pending in the Senate amounting to \$33,865,000 were deducted, leaving a surplus for the quarter ended March 31 of \$30,888,957, and for the six months ended June 30, 1917, of \$71,854,717. During the past six months ended June 30, 1917, \$43,000,000 were expended on account of additions and new construction.

The National Self Cooling Machine Co., Youngstown, Ohio, has organized and purchased a new foundry in addition to about 20,000 ft. of floor space. The company will purchase new equipment to the extent of \$25,000, it is said.

ESTABLISHED 1855

# THE IRON AGE

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## Selective Exemption of Workers

Employers, as a whole, are just beginning to emerge from a mental haze in regard to the working of the draft plan and to appreciate the duty that rests upon them to aid the Government in preventing industrial disruption. It has been the belief of some that the Government would take the initiative to hold skilled labor in the industries essential to the war program; that there would be class exemption in some of the trades. Others thought that the Government had the power and the machinery to assign recruited and conscripted men back to industry. The truth is there is no legislation preventing the voluntary enlistment of skilled and valuable workmen nor any to return to the factories employees who are conscripted through failure to claim exemption.

In the great industrial States, employers have been busy obtaining lists of employees called out by the draft, and with very real patriotism have analyzed these lists with the purpose of appearing before the district exemption boards prepared to claim exemption only for those men whose value to the business is beyond question. There is no evidence of a general intent to ask for the release of employees whose industrial value is not clearly greater than their military value to the country. The line of demarcation between the two classes is plainly drawn. There is no true efficiency in turning a skilled workman over to months of training as a soldier if the industry from which he comes must spend the same period in training a man to take his place, and the product upon which he was working is a component of our badly needed war supplies.

The inclusion of aliens in the registration, but their exclusion from the operation of the draft law, has put a heavy burden upon the American citizens in many districts, both by reason of the exaggerated population figures credited to some cities for draft purposes, thus affecting the total number to be furnished by the city, and more particularly on account of the great preponderance of aliens in certain districts in these cities. Thus it has been predicted that in certain city districts from 1200 to 1600 men must be called for examination to se-

cure a quota of about 250, because of excessive alien registration. The McCumber resolution, which is before a sub-committee of the Senate Foreign Relations Committee as this is written, if enacted into law will permit the conscription of aliens or their deportation upon refusal to serve. The abrogation of certain sections of existing treaties will be necessary before such a law can be passed, but it is reported that the allied countries look with favor upon this move, as at present neither the country of their nativity nor the United States can lay hold upon those aliens resident here.

In one district of Chicago, where 2923 are registered, 2108 are exempt as aliens, leaving only 815 citizens to furnish a quota of 377 soldiers. The alien population of Connecticut, the leading State in the manufacture of munitions, is 37 per cent; of Massachusetts, one of the most important producers of machine tools and mechanics' tools, 29 per cent; Michigan has 19 per cent, and Illinois 15 per cent. In view of these striking figures, some adjustment of the alien problem seems imperative before the next draft is made. Labor is already protesting against the obvious injustice of a condition which forces American workmen into the army while aliens are left free to preempt the jobs of the fighting men and to receive the high wages of industry rather than the low wages of the army.

American labor and its leaders have accepted the draft law and its obligations with a calmness that augurs well for the spirit and morale of our first National Army. The only discordant note has been that struck by an organizer of the ship workers, who made the treasonable threat that he would call a strike in the Delaware shipyards if a single union shipworker is drafted. Strikes now existing in a few places over the country are based solely upon local problems and contentions in no way connected with the draft. The huge shipbuilding program which is now being launched in earnest may call for selective conscription of workmen to fill the complements of the many projected shipyards, but it is certain that any such policy will be so fashioned by the Government and its industrial advisers as to obviate any serious dislocation of labor conditions in other trades.



## Labor Conditions During War

The British, French and other missions came to the United States in order to give us the benefit of their experience in handling war problems. Beyond question it was a great advantage to us, when the new conditions of war arose, to learn how matters had been handled by the countries that entered the war three years ago. There was, however, a curious inconsistency of omission in the plans for imparting information. As a part of the British mission there was a coterie of labor representatives, who communicated information to the Committee on Labor of the Council of National Defense, but so far as we know there was no corresponding committee of British employers to impart information to the employers of the United States. In view of the admitted fact that the prosecution of war requires the speeding up of many industries it is impossible to admit that there was not as much occasion for advice to be given to employers as to employees.

That the trade unions of the United States welcomed the information offered and hope to profit by it is evidenced by the contents of the *American Federationist*. In the June number there were published the formal addresses of the British labor representatives to the Committee on Labor. In the July number there is the first portion of a record of the questions and answers that followed, and this account is to be continued in the August number.

The conference brought out the fact that during the war to date there has been a net increase of more than one million in membership in British trade unions, despite the enlistments, i.e., that the number who joined the unions exceeded the number who left the unions to go to the front by more than one million. This was the testimony of Rt. Hon. James H. Thomas, spokesman of the delegation. He is a member of Parliament and president of the Engineers' Organization of Great Britain. He testified that in the case of his own organization over 100,000 men enlisted, but that despite this loss his union was 122,000 stronger than when the war began.

We were accustomed before the war broke out to regard the United Kingdom as suffering from trade unionism and unable to progress industrially as greatly as Germany largely on that account. We are now given reason to conclude that the war is increasing the United Kingdom's handicap in this respect.

What of the United States? Our employers have not been given advice growing out of the experience of the United Kingdom. Our trade unions have been given advice on their side of the matter. It is true, of course, that early in the war the effort to push industry was overdone and men were worked too hard, it being found later according to exhaustive reports that have been made that a reduction in working time resulted in increased outputs. There is no possibility of our making any such mistake for the simple reason that labor refuses. American employers would be well content to receive a normal day's work for the greatly increased day's pay they are giving. There is no assurance, however, that the British experience will not be duplicated in some degree, that having been that

many more men joined the unions than left the unions in order to fight.

There is no hope of relief in the labor situation through the operation of natural influences. The only thing that is being done is to enact, long after the proper time, the Food Control bill, for the purpose of reducing the cost of living. That is, on general principles, an excellent thing to do, but it will not increase the performance of labor. One of the difficulties in the situation has been that many men, in order to provide themselves with what they desired, did not need to work full time. If they can purchase what they need for less money they will presumably be disposed to work still less. Thus the trends in the labor situation at present appear to be three: men being called to the colors; more labor unions; less work per week. It is high time, in the circumstances, that employers take united cognizance of the situation and seek such palliation of the conditions as may be secured.

## After Effects of War Economies

An important matter that concerns many if not all manufacturers is the changes in demand for manufactured products that will result from the various economies being practised as a result of the war. In the case of the railroads, for instance, the prospects of severe car shortage that were looming so threateningly have been greatly mitigated by the economies that have been introduced by heavier loadings and better handling of cars, whereby a volume of traffic is being handled to-day which a year ago would have been considered impossible with the rolling stock available. There is no reason to suppose that the old ways will be returned to after the war. Then the demand for additional cars will be less than would otherwise be the case, and there will be more funds for expansion in other directions, for more electrification, for instance.

In the agricultural field the scarcity of labor and the desire for the heaviest crops possible will cause an added demand for farm machinery, tractors in particular perhaps, with the important proviso, however, that the machinery is available at something like a reasonable price. If the use of a tractor is commenced on account of scarcity of men and horses its use will not be abandoned when men and horses become more plentiful.

In the automobile field, including both pleasure cars and trucks, the necessity for economizing gasoline will produce a trend towards the vehicles whose specialty is economy in gasoline, and as well, undoubtedly, to those which use kerosene. Necessity is the mother of invention and the inventions once introduced will remain in demand.

In times of peace conditions change as the utility of an article increases in proportion to its cost and as familiarity with the article grows. Manufacturers must constantly watch the trends in order to be provided with facilities to meet increasing demands, or gradually work out of lines for which the demand is decreasing. In wartime the speed of such trends is multiplied indefinitely, and what is frequently no easy task in times of peace becomes an extremely difficult one in times of war. It is quite clear that the economies forced by war will have very important after effects. A manufacturer who looks forward to the end of the war

with the idea that he will then resume "business at the old stand" is in danger of experiencing a rude shock. It is impossible to predict what will occur, but it is safe to assert that very few things will be the same after the war, and the trends should be studied carefully from day to day.

A corollary to this proposition is that as war demands for materials are peculiar to war, having no relation to peace demands, war produces unusual scarcities of certain materials and consumers seek substitutes. The fact that the substitution is forced does not prove that it would not have been advantageous if undertaken in the usual course of events. Return to the former material may not follow. A manufacturing consumer who finds his raw material grown scarce may not do well simply to wait until it becomes plentiful again. His competitor may be finding a substitute which he will use to advantage in future.

### More Urgent Call for Manganese

Ferromanganese receipts from Great Britain are rapidly declining and the situation confronting the steel industry of the United States is not as assuring as it was. With submarine sinkings of 2000 to 3000 tons in the past two months and with an evidently more acute situation in England regarding supplies of manganese ore and metal to meet the increased demands of the steel industry there, future imports from that source are not likely soon to resume the rate needed to meet our total needs of 28,000 tons per month. The May and June available supplies were less than 23,000 and 24,000 tons respectively. The indications are that the July supplies will not be any larger than those of May and June.

In view of these facts the Alloy Committee of the Council of National Defense has just notified the steel industry that all possible conservation of the alloy must be practiced and urges a more liberal use of spiegeleisen where at all feasible.

This unexpected development again brings up the question of a way to meet the situation. It is generally accepted that metallurgically there is no complete substitute for manganese in the important rôle it plays in steel. In practice it is found that only the high percentage alloy is efficient. Both ferromanganese and spiegeleisen are high in carbon. Were lower manganese alloys available, having a low carbon content, they would probably be nearly as satisfactory and find a wide use.

A solution of the problem which holds out some hope is the conversion of our plentiful manganiferous iron ores into a low carbon manganese-iron alloy. Blast-furnace reduction does not meet the problem. The electric furnace may perhaps solve it. The suggestion of intensive and prompt research with a view to ascertaining whether such ores cannot be electrically converted into low-carbon manganese alloys might well be acted on. Such a metallurgical process, successfully carried out on a commercial scale, would be of incalculable value to the steel industry of the United States and perhaps render us independent of foreign sources for manganese. It at least deserves thorough investigation.

## CORRESPONDENCE

### A Manufacturer's View of the Attitude of the Government on Steel Prices

*To the Editor:*—Our country is now facing what may prove to be the greatest crisis in its history. Every patriotic American will be impressed by the high idealism of the recent address of President Wilson. It does not follow, however, that his conclusions as to the best method of realizing these ideals in the conduct of business are worthy of the same approval.

The war is costing at least \$100,000,000 per day. If it can be shortened 30 days, \$3,000,000,000 will be saved to the world. Under these conditions, why waste valuable time attempting to fix artificial prices on commodities required for war purposes?

The United States entered the war to win it, and the way to win it is to have every man in the country take off his coat with this one thought in mind—win the war in the shortest time possible. This can be accomplished only by a declaration by the Government that it is in favor of fair and even liberal prices for all commodities required in the conduct of the war.

For this purpose, steel in various forms is a vital necessity. At a time like this when every resource of the nation should be available to the Government, we find the Government officials and the steel manufacturers facing each other in an attitude of hostility and suspicion. This is an intolerable situation, and demands prompt action. In order to take such action intelligently, however, a reason should be sought for this unfortunate failure to co-operate.

At the beginning of the war the Government through Cabinet officers publicly announced the intention to demand that steel be supplied to the Government at prices which had ruled during normal conditions, absolutely ignoring the abnormally increased cost of production, which will be further increased as the war proceeds, owing to the scarcity of labor. Thus the steel manufacturers, as a matter of self-preservation, have been forced into a defensive attitude.

At various times since, similar announcements have come from Washington, and during the past week Carl Vrooman, a responsible Government official, has denounced the steel makers as "an organization of unpatriotic, selfish, sodden, steel magnates."

The steel manufacturers have made no boast of their patriotism, but they are no less patriotic than their fellow countrymen. They do, however keenly resent the attempt of Government officials, who by training have not the ability to appreciate the problems involved, to place them in a false attitude before the American public.

They do not question the right nor the propriety of the Government insisting upon preference being given to war materials over any other class of business. They do not believe, however, that the Government should attempt to fix arbitrary prices on steel products.

If an attempt is made to do this, in fairness to the manufacturers the cost of every factor entering into production must be fixed by the Government also; and, as it must be evident even to the superficial student of economics that the final cost represents the labor which has been employed on the raw material in all its stages (which, in the ultimate analysis, is estimated to constitute about 85 per cent of the cost of any finished manufactured article) this, of course, involves the fixing of wage rates.

Does the President propose to fix the price at which farmers and planters will sell their wheat, corn, cotton,



sugar and tobacco? Will he undertake to determine the wage rates to be paid workmen in all industries supplying commodities to the Government?

It is only necessary to state this proposition to show how utterly impracticable it is; and we submit that the American people are not yet prepared for such a radical step, even if it were physically possible for the Government to undertake it.

The President says that "we must make the prices to the public the same as the prices to the Government." This means that if any business man should sell even 5 per cent of his output to the Government, the price fixed for this 5 per cent would also govern the remaining 95 per cent which he sells to the public. At the same time his neighbor may be producing a commodity none of which is required by the Government, and he can therefore sell his output at market prices, governed only by the law of supply and demand.

The attempt to fix arbitrarily the price at which any commodity shall be sold for Government use, while at the same time most of the factors entering into the cost of producing that commodity, of which labor is the most important, are not limited and in the nature of the case apparently cannot be, is bound to fail. Even the attempt, however, must have a profoundly disturbing influence on the business of the country.

There is nothing so paralyzing to industry as uncertainty.

The public interest demands that production be stimulated in every possible way, and *this cannot be accomplished by any policy of repression*, which would strangle industry and prevent earnings from which must come the revenues to carry on the war in future years.

Manufacturing plants which by reason of inferior equipment or other disadvantages cannot successfully compete under ordinary conditions must be encouraged to produce the maximum output, and this can only be accomplished by enabling them to make a fair profit over their cost. If these prices should enable more efficient plants to make higher profits, this can and should be equalized through the operation of the excess profits tax.

*The fact should be emphasized that the relation of the Government to sellers is not similar to that of an ordinary purchaser, as by the exercise of the taxing power it can and will automatically recover a large percentage of the price paid for commodities.*

We believe that the Government should have better prices than would be given to any other large and responsible buyer, and that there should be no difficulty in negotiating such prices if the Government officials will appreciate the problems of the manufacturers and negotiate in a spirit of fairness.

Manufacturers and business men generally should be allowed to make liberal profits, so long as their business is being conducted under fair competitive conditions; and then, after these profits have been made, the Government should take from them by taxation their fair proportion of whatever may be necessary to provide the funds for the prosecution of the war, after providing by bond issues for a more equitable share of the burden than has thus far been proposed, to be assumed by future generations, who will reap the benefit of our sacrifices.

Under such conditions, the burden of the war will be distributed fairly, business will follow the natural laws of supply and demand, and there will be no criticism among business men generally, however great the cost may be, providing it is assessed in an equitable manner.

#### A STEEL MANUFACTURER

New York, July 31, 1917.

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# War Industries Board the New Buyer

Frank A. Scott Appointed Chairman—Decision of Priority in Delivery a Function—The Steel Cost Inquiry

WASHINGTON, July 31.—A reorganization of the purchasing system of the Government that is relied upon to bring order out of chaos was decided upon by the Council of National Defense July 28 and promptly approved by the President. A new body, known as the War Industries Board, composed of seven members working under the direction and control of the Council of National Defense and responsible through it to the President, has been created. In this body will be lodged the duty and responsibility of buying war material of all kinds and in addition the board will take over the work heretofore discharged by the general munitions board. The new body will be composed of Frank A. Scott, chairman, Lieut. Col. Palmer E. Pierce, representing the Army, Rear Admiral Frank F. Fletcher, representing the Navy, Hugh Frayne, representing labor, B. M. Baruch, Robert S. Brookings, and Robert S. Lovett.

## A War Industry Clearing House

According to an official announcement made by the Council of National Defense "the board will act as a clearing house for the war industry needs of the Government, determine the most effective ways of meeting them and the best means and methods of increasing production, including the creation or extension of industries demanded by the emergency, the sequence and relative urgency of the needs of the different Government services, and consider price factors, and, in the first instance, the industrial and labor aspects of problems involved, and the general questions affecting the purchase of commodities."

Mr. Baruch has been designated to give his attention particularly to raw materials, Mr. Brookings to finished products, and Judge Lovett to matters of priority. These three members, in association with Mr. Hoover so far as foodstuffs are involved, will constitute a commission to arrange purchases in accordance with the general policy formulated and approved by the council. Concerning the status of the Advisory Commission and its numerous committees and subcommittees heretofore created the Committee on Public Information authorizes the following statement:

The Council of National Defense and the Advisory Commission will continue unchanged and will discharge the duties imposed upon them by law. The committees heretofore created immediately subordinate to the Council of National Defense, namely, Labor, Transportation and Communication, Shipping, Medicine and Surgery, Women's Defense Work, Cooperation with State Councils, Research and Inventions, Engineering and Education, Commercial Economy, Administrations and Statistics, and Inland Transportation, will continue their activities under the direction and control of the Council. Those whose work is related to the duties of the War Industries Board will cooperate with it. The subcommittees advising on particular industries and materials, both raw and finished, heretofore created will also continue in existence, and be available to furnish assistance to the War Industries Board.

The purpose of this action is to expedite the work of the Government, to furnish needed assistance to the Departments engaged in making war purchases, to devolve clearly and definitely the important tasks indicated upon direct representatives of the Government not interested in commercial and industrial activities with which they will be called upon to deal, and to make clear that there is total disassociation of the industrial committees from the actual arrangement of purchases on behalf of the Government. It will lodge responsibility for effective action as definitely as is possible under existing law. It does not minimize or dispense with the splendid service which representatives of industry and labor have so unselfishly placed at the disposal of the Government.

## Board to Cooperate with Allies

The War Industries Board has not yet been clothed with any authority to make purchases for the Allies or to fix prices for them or for private consumers in this country. It is intimated, however, that a plan will soon be worked out by which the board will procure for the Allies substantial reductions in prices which, as to the leading items of supplies, will closely approximate those paid by the United States. There appears to be some uncertainty as to whether the actual work of buying for the Allies will be undertaken by the War Industries Board, and it is possible that supplies for the Allies may be purchased as heretofore, but with the cooperation of the board in securing uniformly reduced prices. In view of the importance of the work of the board in coordinating the interests engaged in turning out war material, it is the opinion of certain members of the Council of National Defense that the body should not be loaded down with the manifold details incident to purchasing for the Allies. All that is necessary can be accomplished in this direction, it is thought, by providing that the board shall cooperate with the Allies' purchasing commissions whenever necessary.

## Priority Highly Important

The function of the board with respect to the dictation of priority of manufacture and shipment is of the greatest possible importance, and Judge Lovett's selection as the priority member of the board has been made with great care. He is a national figure in American railway circles, having served as president of both the Union Pacific and Southern Pacific systems for five years, and since 1913 has held the post of chairman of the executive committee of the Union Pacific System. As priority member of the board he will pass upon all cases in which there is any conflict of requisitions and will rule as to the precedence of all orders for material where the manufacturing or shipping facilities are in any way limited. His rulings will have wide scope and include purchases of material by private parties having Government contracts.

## The Question of Steel Prices

The War Industries Board will probably have a more or less prominent part in the fixing of steel prices on the basis of cost of production as determined by the Federal Trade Commission. As soon as the commission is ready to report the President will summon a meeting of the Council of National Defense, which, it should be remembered, is composed exclusively of members of the Cabinet, and will determine the method to be pursued in fixing the margin of profit to be allowed to steel producers and which, presumably, will include earnings for distribution as dividends and surplus to be utilized in providing necessary extensions. Secretary Baker's official statement, given out after his recent conference with the representatives of the steel producers, pledged the Government to take both these items into account. It is assumed here that the War Industries Board will be called upon for an expression of its views as to the amount of profit to be allowed to steel producers and in view of the experience of the members of the board and the total lack of knowledge of big business problems possessed by the members of the Council of National Defense this fact has a highly important bearing on the pending problem.

It is among the possibilities that the decision of the



Government as to the cost of producing steel will not be reached without a more or less controversial exchange of views between the officials and the leading men in the steel industry. The agents of the commission are now engaged in working on the books of several large producers and some of them are in almost continuous conference with subordinate officials of the steel companies as to the proper method of arriving at costs. It is conceivable that when the commission's figures are finally made up steel men may take exception to them and seek an opportunity to present their views in detail. Whether such opportunity will be afforded before or after the findings of the commission are officially promulgated remains to be seen, but it is believed here that the President will permit the producers to be heard before any basis is adopted to which serious objection is made.

#### The President and Business Men

It is significant of the President's attitude toward the prominent business men who make up the committees and subcommittees of the Council of National Defense that the reorganization just effected of the Government's purchasing system does not involve the elimination of any of these subordinate bodies. It is an open secret here that the Council of National Defense, several weeks ago, recommended to the President the abolition of nearly all the subcommittees appointed by the Advisory Committee and the concentration of all authority in the hands of three boards. It is now stated that the President not only recognizes the patriotic work done by the business men who have so cheerfully put aside their own affairs and come to Washington to assist the Government, but sharply resents the unjust criticism of these men at the hands of certain Senators and Representatives. The sentiments of the President with respect to this matter are understood to be reflected in the memorandum concerning the appointment of the War Industries Board prepared by the Council of National Defense and quoted above.

#### Interest of Committeemen in Contracts

The bill providing for the control of food, feed and fuel, which is now in the hands of the Conference Committee, will carry a provision imposing certain restrictions upon the business men who make up the committees of the Council of National Defense. When this bill was amended by the Senate Committee on Agriculture a section was inserted making it "unlawful for any person acting either as a voluntary or paid agent or employee of the Government in any capacity, including an advisory capacity to any commission, board, or council of the Government, to procure, attempt to procure, or make any contract for the purchase of any supplies for the use of the Government either for himself, from any firm of which he is a member, or corporation of which he is an officer or stockholder, or in which he has any financial interest." It was pointed out in the Senate that the adoption of this provision would force the disbanding of practically all the subcommittees of the Council of National Defense and it was finally rejected. The subject was revived before the conference committee, which has adopted the following substitute:

No person acting either as a voluntary or paid agent or employee of the United States in any capacity, including an advisory capacity, shall solicit, induce, or attempt to induce any person or officer authorized to execute or to direct the execution of contracts on behalf of the United States to make any contract or to give any order for the furnishing to the United States of work, labor, or services, or of materials, supplies, or other property of any kind or character, if such agent or employee has any pecuniary interest in such contract or order, or if he or any firm of which he is a member, or corporation, joint stock company, or association of which he is an officer or stockholder, or in the pecuniary profits of which he is directly or indirectly interested, shall be a party thereto. Nor shall any agent or employee make or be a member of any committee or other

body which shall make or participate in making any recommendation concerning such contract or order to any council, board, or commission of the United States, or any member or subordinate thereof, without making to the best of his knowledge and belief a full and complete disclosure in writing to such persons or group of persons of any and every pecuniary interest which he may have in such contract or order and in any party thereto, nor shall he participate in making such contract or giving said order. Any willful violation of any of the provisions of this section shall be punished by a fine of not exceeding \$10,000 or by imprisonment for not more than five years, or both.

At this writing the conference committee on the food, feed and fuel control bill is still wrestling with the question as to whether the so-called Smoot-Owen amendment providing for a joint committee on war expenditures shall be authorized. President Wilson has protested against the creation of such a committee on the ground that it would only serve to harass officials of the administration and would indicate a lack of confidence in the President himself. The indications are that the amendment will ultimately be rejected.

W. L. C.

## SERIOUS STRIKE ENDED

### Railroad Brotherhoods Compel Trainmen to Return to Work

CHICAGO, July 31 (By wire).—Officials of three of the Railroad Brotherhoods—Locomotive Engineers, Firemen and Conductors—forced a termination of the Switchmen's strike, which for two days seriously interfered with the movement of freight in the yards of 19 of the railroads entering Chicago. The strike was declared Saturday morning by the Brotherhood of Railway Trainmen, while the end was ordered at 5.39 o'clock Monday morning. The tie-up was by no means complete, inasmuch as the Switchmen's Union of North America did not participate in the strike. The latter body asserted that the strike was an attempt to eliminate it from the situation. It has several thousand members.

In the agreement forced upon the Brotherhood of Railway Trainmen, it was arranged that the points at issue should be left to a committee of railroad managers and brotherhood officials. The disputed points included meal hours, method of appointing yardmasters, reinstatements and employment of new men.

The leader of the striking switchmen was subjected to much criticism, both from within and without the union. The conciliatory railroad men acted because of patriotic motives and fear that the strike might bring about a compulsory arbitration law. The strike was declared by James Murdock, vice-president of the Brotherhood of Railway Trainmen, acting for W. G. Lee, president, who is ill.

#### Institute Meeting

The autumn meeting of the American Iron and Steel Institute will be held at Cincinnati, Friday and Saturday, Oct. 26 and 27. These dates have just been announced by Secretary James T. McCleary. The meetings will be held in the Hotel Sinton.

The labor troubles which have existed between the International Brotherhood of Boilermakers, Iron Shipbuilders and Helpers of America and the St. Louis Association of Boiler Manufacturers were adjusted July 27 at St. Louis under a two-year contract which becomes effective Aug. 2, under which union men gain an advance of 25 per cent over the present scale and will work eight hours a day. More than 350 men and 13 shops are affected. The shops of the John O'Brien Boiler Works Co., the Joseph A. Wangler Boiler & Sheetiron Works and the Heine Safety Boiler Co., where strikes are in progress, are not affected by the agreement.

# Iron and Steel Markets

## RAILS FOR FRENCH LINE

### Our Government Buys 150,000 Tons

#### Heat Cuts Down Outputs—Quiet Market to Continue

Active buying of iron and steel products by the Government, in some cases with prices stipulated, but for the most part at prices to be fixed later, is in contrast with the continued abstention of private buyers from the market. There is little dissent from the view that present conditions are likely to last for some time and that if meantime some of the price peaks come off, the steel trade will not suffer.

Along with intimations that the inquiry into steel making costs will take longer than was counted on are signs of a more reasonable attitude at Washington as to the prices to be paid for steel products. But the uncertainties of the situation are enough to give concern to a good many manufacturing consumers of steel in view of exaggerated reports of the amount of the country's output the Government and its Allies are likely to require.

For the most part—there are some exceptions—steel manufacturers are quite willing to see the present check on the long continued bidding of buyers for material under the fear that they could not get enough to continue in operation.

Chief of passing developments have been the buying of 150,000 tons of rails by the Government for the building of a double track railroad from its French port to its battle front, a marked reduction in output of steel works and rolling mills due to the extreme heat in all producing districts, and the efforts of manufacturers in steel and metal working lines to have exempted from conscription enough employees to hold output of war materials where it is.

The Washington Government's railroad operations in France will be on a large scale and a vast engineering program is involved. There will also be considerable buying of light rails for portable tracks. The standard sections just bought are 80-lb. rails. Either Bessemer or open-hearth rails will be accepted, \$38 per gross ton being paid for the former and \$40 for the latter. For angle bars 3.25c. was paid and for track bolts and nuts 5.50c. Deliveries are to be completed by Oct. 1. The Steel Corporation took 90,000 tons of the rails and the remainder was divided between three companies.

Over against the above prices for rails, which are those at which railroads bought last year for late 1917 delivery, are current sales at 100 per cent higher. At Chicago a 700-ton sale of rails has just been made at \$85. For the Government's French railroad, 300 locomotives have been placed, and there are negotiations for 17,000 cars. About 100,000 kegs of spikes are wanted.

France's plate purchases through J. P. Morgan

& Co., of which 25,000 tons was reported last week, run up to about 60,000 tons, at 6c. for hull steel and 8.50c. to 9c. for boiler steel.

The holding up of certain export rollings has been the first effect of the embargo enforcement, and the effect on prices of resales of some materials for which irrevocable credit had been provided is having some consideration.

In the present situation, all price tendencies are toward easier conditions, but with mills booked so far ahead the change thus far is scarcely measurable. On sheets, offerings by jobbers in the Central West have been below the prices of some mills, or on an 8.50c. basis for black and blue annealed, and 10.50c. for No. 28 galvanized.

Export as well as domestic inquiry for plates continues heavy. No sudden increase in the percentage of plate-mill output taken by the Government is expected, and there is a very considerable tonnage available for the general market. The new plate mill of the Jones & Laughlin Steel Co. has just been started.

Next to the enormous earnings made on contract prices well below those now current, the striking facts about the Steel Corporation's statement are the setting aside of \$87,000,000 for the half year against excess profits taxes, and the statement that \$43,000,000 had been expended since Jan. 1 on new construction. Neither of these items would be possible on the cost-plus basis that has been proposed for Government steel contracts.

Better car supply for Connellsville coke is not adding materially to pig-iron production. In the months of acute car shortage many coke workers left for other employment, and now that there are more cars labor is not at hand for an increase in output.

The let-up in pig-iron buying has modified extremes in prices. While a large amount of iron had been sold for the first half of 1918, a good many important consumers of foundry iron have refrained from buying for that delivery, and their disposition is to wait for the clearing up of the present uncertainty. Some Central Western pig-iron producers have stopped at \$55 for No. 2 foundry, as the beginning of an effort to moderate the market; but buyers show no signs of being attracted by such mild measures, with the prospect of Government regulation of prices for coal and coke.

## Pittsburgh

PITTSBURGH, July 31.

The local steel market is still marking time, and it is not believed there will be any new buying of consequence until the Government defines clearly its position in regard to prices. Consumers are not buying a pound of material they can possibly avoid, and will not do so under present uncertain conditions. The mills are not embarrassed in the slightest by the falling off in new orders, as they have obligations on their books that will take all their output for a good part of the remainder of this year. Prices, under the cessation of new buying, are holding up very well, but the opinion is pretty general that the top has been reached, and later on there may be a readjustment to a lower level. Prices on pig iron in the past week have stood still, also on coke, but



## A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Aug. 1, 1917.	July 25, 1917.	July 3, 1917.	Aug. 2, 1916.
No. 2 X, Philadelphia...	\$53.00	\$53.00	\$52.00	\$19.75
No. 2, Valley furnace...	53.00	53.00	55.00	18.25
No. 2 Southern, Cin'ti...	49.90	49.90	49.90	16.90
No. 2, Birmingham, Ala...	47.00	47.00	47.00	14.00
No. 2, furnace, Chicago*	55.00	55.00	55.00	19.00
Basic, del'd, eastern Pa.	50.00	50.00	50.00	19.00
Basic, Valley furnace...	52.00	52.00	52.00	18.00
Bessemer, Pittsburgh...	55.95	55.95	57.95	21.95
Malleable Bess., Ch'go*	55.00	55.00	55.00	19.00
Gray forge, Pittsburgh...	46.95	46.95	47.95	18.70
L. S. charcoal, Chicago...	58.00	58.00	57.00	19.75

Rails, Billets, etc. Per Gross Ton:	Aug. 1, 1917.	July 25, 1917.	July 3, 1917.	Aug. 2, 1916.
Bess. rails, heavy, at mill	38.00	38.00	38.00	33.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	35.00
Bess. billets, Pittsburgh...	100.00	100.00	100.00	43.00
O.-h. billets, Pittsburgh...	100.00	100.00	100.00	45.00
O.-h. sheet bars, P'gh...	105.00	105.00	105.00	45.00
Forging billets, base, P'gh	125.00	125.00	125.00	69.00
O.-h. billets, Phila...	110.00	110.00	110.00	45.00
Wire rods, Pittsburgh...	95.00	95.00	95.00	55.00

### Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia...	4.659	4.659	4.659	2.659
Iron bars, Pittsburgh...	4.75	4.75	4.75	2.50
Iron bars, Chicago...	4.50	4.50	4.50	2.35
Steel bars, Pittsburgh...	4.50	4.50	4.50	2.50
Steel bars, New York...	4.669	4.669	4.669	2.669
Tank plates, Pittsburgh...	9.00	9.00	9.00	3.50
Tank plates, New York...	10.169	10.169	9.169	3.669
Beams, etc., Pittsburgh...	4.50	4.50	4.50	2.50
Beams, etc., New York...	4.669	4.669	4.669	2.669
Skelp, grooved steel, P'gh	4.00	4.00	4.00	2.35
Skelp, sheared steel, P'gh	6.00	6.00	6.00	2.45
Steel hoops, Pittsburgh...	5.75	5.25	5.25	2.75

\*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Aug. 1, 1917.	July 25, 1917.	July 3, 1917.	Aug. 2, 1916.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	8.50	8.50	8.50
Sheets, galv., No. 28, P'gh	10.00	10.00	10.00
Wire nails, Pittsburgh...	4.00	4.00	4.00
Cut nails, Pittsburgh...	4.65	4.65	4.65
Fence wire, base, P'gh...	3.95	3.95	3.95
Barb wire, galv., P'gh...	4.85	4.85	4.85

### Old Material, Per Gross Ton:

Iron rails, Chicago...	\$40.50	\$41.50	\$47.00	\$18.50
Iron rails, Philadelphia...	45.00	45.00	52.00	20.00
Carwheels, Chicago...	30.50	32.00	37.00	12.00
Carwheels, Philadelphia...	35.00	35.00	38.00	15.50
Heavy steel scrap, P'gh...	33.00	36.00	42.00	16.25
Heavy steel scrap, Phila...	32.00	32.00	40.00	14.75
Heavy steel scrap, Ch'go...	29.00	30.00	36.00	15.25
No. 1 cast, Pittsburgh...	34.00	32.00	36.00	15.00
No. 1 cast, Philadelphia...	35.00	35.00	39.00	16.00
No. 1 cast, Ch'go (net ton)	27.00	28.50	30.50	11.50
No. 1 RR. wrot, Phila...	45.00	48.00	57.00	19.50
No. 1 RR. wrot, Ch'go (net)	33.50	35.00	40.00	15.25

### Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$10.00	\$11.00	\$15.00	\$2.75
Furnace coke, future...	10.00	10.00	9.50	2.50
Foundry coke, prompt...	12.00	13.00	13.00	3.25
Foundry coke, future...	10.00	10.00	10.00	3.50

### Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	29.00	26.00	31.75	26.25
Electrolytic copper, N. Y.	29.00	26.00	31.75	26.00
Spelter, St. Louis...	8.50	8.50	9.00	9.25
Spelter, New York...	8.75	8.75	9.25	9.50
Lead, St. Louis...	10.75	10.25	11.25	6.00
Lead, New York...	10.87 1/2	10.25	11.37 1/2	6.10
Tin, New York...	63.75	62.50	62.00	38.00
Antimony (Asiatic), N. Y.	15.00	15.00	19.00	12.50
Tin plate, 100-lb. box, P'gh	\$12.00	\$12.00	\$12.00	\$6.00

on scrap have further declined from \$2 to \$3 per ton. The extremely hot weather of the past week has curtailed output very materially, notably among blast furnaces, steel works, sheet and tin plate and pipe mills. There is also a falling off in output of coke, most of the coal miners and coke workers refusing to work more than about four days a week. The Government is steadily placing orders for pig iron, and for nearly all lines of finished steel. No announcement as to what the Government will do on prices of steel products will be made until the Federal Trade Commission has completed its investigation of costs.

**Pig Iron.**—There is almost an entire absence of new inquiry for pig iron, but prices are holding fairly steady. Consumers of Bessemer, basic and foundry iron are taking it in as promptly as at any time for a year or more, and in fact some consumers are insisting that shipments come forward more promptly. The melt of pig iron is as heavy as it has been at any time, but consumers are using iron bought on old contracts, and refuse to buy ahead until the situation clears. It is said that several large lots of basic iron have been offered in the past week for fairly prompt shipment, but concerns to which this iron was offered said they were not interested. We note a sale of 1000 tons of basic iron for prompt shipment at \$52, Valley furnace. It is said that some Western blast furnaces will be called on to furnish about 10,000 tons of No. 2 foundry iron for Western use to be used in making castings for Government work. The resale Bessemer iron seems to have been pretty well cleared up, and none has been offered in this market in the past few days. The Shenango Furnace Co. will change over its No. 4 furnace at Sharpsville, Pa., from Bessemer to basic iron for a week or two.

We quote Bessemer iron at \$55; basic, \$52; malleable Bessemer, \$53; No. 2 foundry, \$53 to \$55, and gray forge, \$46 to \$47, all f.o.b. at Valley furnace for delivery this year. The freight rate from Valley furnaces on pig iron to the Cleveland and Pittsburgh districts is 95c. per ton.

**Billets and Sheet Bars.**—We do not hear of any new sales of billets or sheet bars in the past week, nor is there any steel in the hands of dealers or others that is pressing the market for sale. Steel mills are filled up for months ahead with contracts from regular customers, on which shipments are going forward promptly, but there is an entire lack of new inquiry. This condition will likely prevail until the Government announces its policy as to prices on steel. If it should fix prices on billets and sheet bars to domestic consumers, they would probably be much under what are regarded as to-day's market prices. A sale of about 100 tons of ordinary carbon forging billets is reported at about \$130, delivered.

We now quote soft Bessemer and open-hearth billets at \$95 to \$100 and soft Bessemer and open-hearth sheet bars at \$105 to \$110, maker's mill, Pittsburgh or Youngstown. We quote forging billets at \$125 to \$135 per ton for ordinary sizes and carbons, f.o.b. maker's mill.

**Steel Rails.**—As is the case on other lines of semi-finished steel, the new demand for steel rails is not so active, and probably will remain quiet until the present uncertainty as to prices has been removed. The mills that roll new light rails, and also the re-rolling rail mills, are filled up for months ahead. No new orders are being placed for standard sections. Prices on new light rails and standard sections are given on page 289.

**Ferromanganese.**—The new inquiry is light, consumers evidently being well covered on ferromanganese for some time ahead. Prices are ruling fairly steady, but are not as strong as some time ago. For delivery over last half of this year, we quote 80 per cent domestic ferromanganese at \$350 to \$375 and for first half of next year \$350 or less, f.o.b. cars, maker's furnace. We quote 18 to 20 per cent spiegeleisen at \$80 to \$85 per gross ton at furnace.

We quote 9 per cent Bessemer ferrosilicon at \$89, 10 per cent \$90, 11 per cent \$95, 12 per cent \$100, 13 per cent \$105, 14 per cent \$115, 15 per cent \$125, and 16 per cent \$135. We now quote 7 per cent silvery iron at \$84 to \$89, 8 per cent \$85 to \$90, 9 per cent \$86 to \$91, 10 per cent \$87 to \$92, 11 and 12 per cent \$88 to \$93. All f.o.b. maker's furnace.

Jackson or New Straitsville, Ohio, and Ashland, Ky., these furnaces having a uniform freight rate of \$2 per gross ton for delivery in the Pittsburgh district.

**Plates.**—It is said the Government will shortly place an order for about 17,000 cars for France, to be divided among four or five of the leading car builders. These will be 4-wheel, 12 metric tons capacity, flat bottom, low side gondolas. The Government will also likely place in the near future, large orders for artillery trucks for use of American troops in France. The Pressed Steel Car Co. is building 80 steel gondolas and 20 steel hoppers for the Youngstown Steel & Tube Co. No new active inquiries are in the market for steel cars, and none is expected until the situation as regards steel prices is clearly defined. The new inquiry for plates is not so active, consumers not buying a pound they can possibly avoid, but prices are holding strong. We quote  $\frac{1}{4}$  in. and heavier sheared plates for delivery over the remainder of this year at 9c. to 10c. at mill while small lots from warehouse bring 12c. to 13c. and higher. The Jones & Laughlin Steel Co. has started its 128-in. plate mill installed in its Soho works, this city, and it will turn out about 15,000 tons of plates per month, when running full.

**Structural Material.**—The new inquiry is very light, and only small lots are being placed. Warren Moore & Co. have been notified by the Navy Department that their bid on the construction of the steel buildings to contain the projectile and armor plate plants for the Government at Charleston, W. Va., is the lowest of those received. This work will take about 2500 tons of fabricated steel. The American Bridge Co. has taken 400 tons for a new machine shop for the Auto Car Co., at Ardmore, Pa., and about 300 tons of bridge works for the Pennsylvania railroad. Prices on structural steel given on page 289.

**Sheets.**—The Navy Department will probably place soon, 5000 tons of steel sheets among the mills, and other direct and indirect Government orders are being placed with the mills right along. The new demand for sheets from the domestic trade is quiet, buyers holding off until more is known of the action the Government will take as to prices. As noted last week, the Government has been paying about \$40 per ton less for all grades of sheets than those being charged to domestic consumers on new orders, and it is not believed that the Government, should it decide to fix prices to domestic consumers, will name prices any lower than it has been paying itself. The opinion is, however, that the Government will not take any action in regard to prices to be charged to the domestic trade for sheets. Prices are ruling fairly firm, but it is believed the crest has probably been reached. Mill prices for carloads and larger lots to the domestic trade are given on page 289.

**Tin Plate.**—On Tuesday, July 31, the American Sheet & Tin Plate Co. announced a new schedule of prices on terne plate, showing an advance of \$2 to \$2.50 per package. It is likely these prices will also be adopted by the few independent mills that are rolling terne plate. Recently the Government placed 50,000 base boxes of bright plate at \$8.50, divided among the American Sheet & Tin Plate Co., which took the larger part, and the independent mills. A sale of 10,000 boxes of bright tin plate for export is reported to have been made at \$57.50 per base box. Three or four mills that formerly rolled only terne plate have put in tinning pots and are now taking fairly large orders for bright plate for prompt shipment. One of these mills took the order noted above. Further Government orders are expected to be placed in a short time. It is still believed that the demand for tin plate over the next two or three years will be enormously heavy, and large additions to present capacity must be made within the next year or so to meet it. This country will likely be called on to furnish a large part of the tin plate needed by the Allies and other countries over the next two or three years. Sales of bright plate from stock have been made at as high as \$14 per base box. We quote bright plate on current orders from stock at \$12 to \$14 per base box, f.o.b. mill, Pittsburgh. There has been a slight falling off in the new demand for tin plate from jobbers, due to the uncertainty as to

the attitude to be taken by the Government in regard to fixing prices on steel. The new prices on terne plate effective from July 31, are given on page 289.

**Iron and Steel Bars.**—The new demand for both iron and steel bars has quieted down somewhat, but this does not worry the mills, as they have obligations on their books that will take the greater part of their output over the remainder of this year. Specifications against contracts are reported as coming in at a fair rate. One or two of the new bar mills of the Carnegie Steel Co., at McDonald, Ohio, are expected to be ready for operation within 60 days. The opinion is pretty general that prices on iron and steel bars have about reached the top. These are given in carloads and larger lots to regular domestic customers on page 289.

**Hoops and Bands.**—The new buying in hoops and bands is light. Most consumers are covered over the remainder of this year. Small lots of hoops for fairly prompt shipment range from 6c. to 7c. and on bands from 5.50c. to 6c. to regular customers, but some sales for both hoops and bands have been made at higher prices.

**Muck Bar.**—We quote best grades of muck bar, made from all pig iron at \$95 to \$100 per gross ton, at mill.

**Wire Rods.**—Mills report a continued active demand for both soft and high carbon rods, and prices are holding very firm. We note two sales of 500 tons each of soft Bessemer and open hearth rods at \$95 per gross ton at maker's mill for fairly prompt shipment. Considerable exports of wire rods are still being made to Canada on contracts taken some time ago. The uncertainty as to prices on finished steel products apparently has not yet affected prices on rods, which are very strong and they are given in detail on page 289.

**Wire Products.**—The sub-committee on wire products placed last week 25,000 kegs of wire nails for Government use, of which about one-half will be furnished by the American Steel & Wire Co., and the remainder by independent mills. It is understood these nails are to be used largely by the Government in the permanent training camps in the South. The sub-committee on wire rope has also placed about 8000 tons among various makers, out of the 24,000 tons that the Government will eventually need. The War Department also placed 3000 to 5000 kegs of wire nails for auxiliary camps along the great lakes, this order having been taken by the American Steel & Wire Co. All the Government orders for wire nails are being furnished at the \$3.20 base price. The new demand for wire nails is dull, and jobbers are anxious to work off their stocks, as much as they can, in view of possibly lower prices on wire nails when the Government definitely states its policy as to prices. So far, none of the independent wire mills has made any reduction on wire nails or wire, on account of the confusion existing in the jobbing trade by reason of the wide difference in prices on wire products of the American Steel & Wire Co., and the independent mills. The American Steel & Wire Co. is still quoting to its regular customers for indefinite delivery \$3.20 base for wire nails and \$3.25 for bright basic wire per 100 lb., at mill. Prices quoted on wire and wire nails by the independent mills, some of which can make fairly prompt delivery are given on page 289.

**Shafting.**—The Government has lately placed orders for shafting material for fuses and nose pieces for 9,000,000 3-in. shells. It is estimated that at present the Government is taking fully 40 per cent of the entire output of shafting on direct and indirect orders, and makers of shafting believe that this will be increased in the near future to probably 60 per cent, and may run to 75 per cent. New orders and specifications for shafting from the automobile and screw stock machine trades have fallen off very materially, and many automobile concerns, instead of building pleasure cars and business trucks, are getting into the manufacture of airplane motors. As yet, prices on shafting have shown no tendency toward lower values, discounts remaining firm at 10 and 5 per cent off list, depending on size of the order and the customer, while a few small sales are made at list.

**Railroad Spikes and Track Bolts.**—The Government has just sent out an inquiry for 100,000 kegs of stand-



ard size railroad spikes for shipment to France, and has asked for prompt delivery. It is probable that if the order is placed it will be divided among the different spike makers pro rata on their capacity. All the spike makers are filled up with orders for months ahead, and are not anxious to take on more new business. Boat spike makers are not quoting to domestic trade, desiring to conserve their entire output for Government use in shipyards, it being believed that the Government's boat building program will take practically the entire output of rivet spikes for a year or two years. Nearly all makers of spikes are quoting \$7 per 100 lb. on all sizes.

**Cold Rolled Strip Steel.**—Makers of strip steel products are receiving large orders from the Government, direct and indirect orders from builders of airplanes in all parts of the country. It is said that fully 25 to 30 per cent of the output of the cold rolled strip steel makers is now being devoted to the Government's direct and indirect orders, and this may increase to 40 per cent in the near future. Makers are still taking orders for only 60 days ahead and 50 per cent of the specification must accompany each order, and the other 50 per cent in 30 days. Prices are firm, and the falling off in demand for finished steel products on account of the uncertainty of the Government action is not causing any weakness in prices on cold rolled strip steel.

On contracts, mills are quoting 9c. at mill, but on small current orders prices range from 10c. up to 12c. at mill. Terms are 30 days, less 2 per cent off for cash in 10 days when sold in quantities of 300 lb. or more.

**Nuts and Bolts.**—Makers of nuts and bolts are receiving fairly large direct and indirect orders from the Government and the quantity needed is expected to increase largely in the near future. Deliveries to domestic consumers are only fairly good, the shortage in steel and labor cutting down output of nuts and bolts to some extent. The general demand is reported fair, but not as heavy as a month or six weeks ago. Discounts adopted on April 12 last, which give prices to the large trade in carloads, over which advances are charged on small lots, are given on page 289.

**Rivets.**—The expected Government order for 35,000 tons of rivets has not been placed by the shipbuilders and will not be until they are called upon by the Emergency Fleet Corporation for the first allotment of ships. Fairly large direct and indirect orders for rivets are being placed by the Government, but the domestic demand is quiet, most consumers being well covered over the remainder of this year, and others are not disposed to place new orders until the Government action on prices is known.

Prices on structural rivets for delivery up to Oct. 1 only are \$5.25 per 100 lb., base, and on cone head boiler rivets \$5.35 base, per 100 lb., f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent off for cash in 10 days.

**Wrought Pipe.**—No further important orders for wrought pipe have been placed by the Government, aside from the 640,000 ft. of 6-in. and the 138,000 ft. of 4-in. noted in this report last week. It is stated, however, that further Government direct and indirect orders for pipe will come out in a short time. Mills are watching the distribution of their output very closely, desiring to conserve as much of it as possible for the expected Government demand, which will be for prompt shipment. Three or four leading pipe mills are practically out of the market on lap weld iron and steel pipe for this year delivery, but are taking care of regular customers to the best of their ability. Numerous inquiries are coming out from time to time for gas and oil lines, but no attention is paid to these, as the mills cannot handle them and make delivery. On butt weld iron and steel pipe the demand is not so urgent, and shipments can be made in eight to 12 weeks from date of order, depending on size and the quantity wanted. Discounts on steel pipe, as adopted on May 1, in effect by most of the independent mills and on iron pipe, as adopted July 1, are given on page 289.

**Boiler Tubes.**—Government direct and indirect orders for iron and steel boiler tubes are still getting larger, and it is now estimated that fully 40 per cent of the output of tubes is going to the Government. It is said that the leading maker of steel tubes is shipping fully 50 per cent of its output on Government direct

and indirect orders. Heavy premiums over regular prices for small lots of iron and steel tubes are being paid for fairly prompt delivery, this sometimes amounting to as much as \$40 per ton or more. Nominal discounts on iron and steel tubes, as adopted Nov. 1, 1916, but which show prices very much below the actual market, are given on page 289.

**Coke.**—The supply of cars in the coke regions up to Thursday, July 26, was 100 per cent., a much larger car supply than there was coke to load. The cars were then cut down and a shortage developed, with the result that the price of prompt blast furnace coke has held steady at \$10 at oven for shipment to the valleys and further west. Eastern blast furnace coke has sold at \$11 per net ton at oven. Nothing is being done in contracts, furnaces preferring to buy from day to day, while operators desire to sell their coke in that way until it is known definitely whether the Government will regulate prices on coke. We now quote best grades of blast furnace coke for spot shipment at \$10 for delivery to Valley and Western blast furnaces, while for shipment East as high as \$11 is being done. We quote 72-hr. foundry coke at \$11.50 per net ton at oven for prompt shipment. The demand for spot furnace coke is fairly active. The Connellsville *Courier* gives the output of coke in the Upper and Lower Connellsville regions for the week ending July 21 as 362,148 tons, an increase over the previous week of 12,629 tons.

**Old Material.**—The local scrap market, as far as sales go, is at practically a complete standstill. Consumers will not buy material under present uncertain conditions, and dealers appreciate fully that it would be useless to try to force sales, and are not attempting to do so. Not enough scrap material is being sold in this market on which to base prices ruling, but in a general way the whole market is from \$1 to \$3 per ton lower than last week. A few small dealers who are not in position to hold their scrap are disposing of it at the best prices they can get, and this is having the effect of depressing the entire market. Dealers will not go short on the present market, and several report they have not closed a single transaction in the past week. Prices, therefore, are largely nominal in the absence of sales.

Dealers quote for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh delivered .....	\$33.00 to \$34.00
No. 1 foundry cast .....	34.00 to 35.00
Re-rolling rails, Newark and Cambridge, Oh. o; Cumberland, Md., and Franklin, Pa. ....	40.00 to 41.00
Hydraulic compressed sheet scrap ..	28.00 to 29.00
Bundled sheet scrap, sides and ends, f.o.b. consumer's mill, Pittsburgh district .....	23.00 to 24.00
Bundled sheet stamping scrap .....	21.00 to 22.00
No. 1 railroad malleable stock .....	29.00 to 30.00
Railroad grate bars .....	18.00 to 19.00
Low phosphorus melting stock .....	46.00 to 48.00
Iron car axles .....	47.00 to 50.00
Steel car axles .....	47.00 to 50.00
Locomotive axles, steel .....	55.00 to 60.00
No. 1 busheling scrap .....	26.00 to 27.00
Machine-shop turnings .....	18.00 to 19.00
Cast-iron wheels .....	33.00 to 34.00
Rolled steel wheels .....	37.00 to 38.00
*Sheet bar crop ends .....	44.00 to 45.00
Cast-iron borings .....	19.00 to 20.00
No. 1 railroad wrought scrap .....	38.00 to 39.00
Heavy steel axle turnings .....	24.00 to 25.00
Heavy breakable cast scrap .....	27.00 to 28.00

\*Shipping point

## Chicago

CHICAGO, July 30.

Government orders in great volume have come to the leading interest and it is a safe assertion that it is bearing the brunt of the war demand so far developed. Some of the work which has poured in calls for material to go to France. All sorts of steel products are demanded, including shell steel and forgings for field and naval guns, the latter being of alloy steels. It is understood that this business is taken subject to a later adjustment of prices. The steel market in general is but little changed, except that new demand is lighter,

in regard to both inquiries and sales. The quiet is not displeasing. One company reports difficulty in obtaining export licenses which would enable it to fill old orders placed by Japanese interests for plates, shapes and bars. Although steel makers are quite generally of the opinion that the Government will not attempt by compulsory law to fix prices for private consumers, many of the latter seem to feel that something of the kind may happen and that they had better hold off in purchasing. That prices have reached their zenith is unquestioned. Pig iron is firm, but extremely dull. Ferromanganese is easier, delivery this year being obtainable at \$375, delivered, and first half at \$350. Old materials continue to decline in a quiet market. For about 350 tons of 20 per cent spiegeleisen \$90 was paid. An inquiry for 1500 tons of low phosphorus iron is before some makers. For 700 tons of standard section rails wanted for industrial purposes \$85 was paid in this market.

**Pig Iron.**—Business has been confined to occasional purchases of small lots wanted for prompt shipment, and a few transactions in resale iron, but prices remain firm. Northern No. 2 foundry, basic and malleable Bessemer quotations are unchanged at \$55, furnace, delivery this side of next July. Southern iron, delivered this year, is held at \$50, Birmingham, or \$54, Chicago, and for the first half at \$45 to \$48, Birmingham. Northern makers welcome the quiet, inasmuch as they are well sold up, and the coke situation is not a pleasing one. Their efforts are concentrated in making deliveries. They were not seriously affected by the strike of switchmen in Chicago. Both foundry and charcoal resale iron have been dealt in recently, the offerings being made in one instance because of a dry strike, and in another because the builder of a new foundry saw a way to clear several thousand dollars. The Southern furnaces, like those in the North, are chiefly engaged in making shipments, their chief trouble being the shortage of freight cars, although they are still hampered by an inadequate coke supply. In the matter of coke, the Sloss-Sheffield Steel & Iron Co. was helped out by the action of the city of Birmingham in permitting the company to resume operations at some old ovens which were within the city limits and which were condemned two or three years ago. To some extent the same company has been enabled to circumvent the car shortage by shipping in barges from two of its furnaces in Sheffield and one at Florence. It fortunately happens there is 9 ft. of water in the Tennessee river at the point where the barges can be loaded. Very little silvery iron is available, and the minimum quotation of \$82.75, Chicago, still stands, although much higher is asked for some brands. In charcoal iron the inquiries are few and the makers are bending their energies to filling contracts. The base price, or that for grades Nos. 1 (foundry) to 4, is unchanged at \$56, furnace, or \$58, Chicago, while for grades 5 and 6, Scotch and No. 1 (soft or special) the price is \$58.50, furnace, or \$60.50, Chicago. For next year, \$1 under these prices can be done in some directions. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b., furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 1 to 4.....	\$58.00
Lake Superior charcoal, Nos. 5 and 6.....	
Scotch and No. 1 soft or special.....	60.50
Northern coke foundry, No. 1.....	55.50
Northern coke foundry, No. 2.....	55.00
Northern coke foundry, No. 3.....	54.50
Northern high-phosphorus foundry.....	55.00
Southern coke No. 1 f'dry and 1 soft.....	55.00
Southern coke No. 2 f'dry and 2 soft.....	54.00
Malleable Bessemer.....	55.00
Basic.....	55.00
Low-phosphorus.....	\$93.00 to 95.00
Silvery, 8 per cent.....	82.75

**Ferroalloys.**—Quotations for 80 per cent ferromanganese are lower in the face of a situation that had every appearance of strength. For the rest of this year domestic material can be had at \$375, delivered, and for the first half at \$350, despite the uncertainty of importations of the foreign manufactured product, or manganese ore from Brazil or elsewhere. The situation is laid at the door of a comparatively new maker

of ferromanganese whose offerings have been below the market heretofore established. Small lots of ferromanganese have been lately purchased in this market at \$410.

**Plates.**—An overwhelming business in plates could be done were the mills agreeable to accepting business. Some of them are entirely out of the market, except where the United States Government is concerned, others are said to be taking on small tonnages at prices that range from 10c. to 12c. for tank plates. Ship plates run 1c. to 1½c. higher. A large Western mill has had difficulty in obtaining licenses to ship, not only plates, but shapes and bars, to Japan, just for what reason is not clear unless it is that the Government desires to hold the material for its own use. The principal interest is selling none, except to the Government. Chicago warehouse prices are unchanged.

We quote for Chicago delivery out of jobbers' stocks, 8c.

**Structural Material.**—Instances multiply where building projects requiring structural shapes have been postponed indefinitely because of the scarcity and resultant high prices. One sees work stopped on the foundations of a large hotel, hears of an office-building addition being deferred and the postponement of operations in erecting a large malleable iron foundry, etc. A nominal price for shapes may be said to be 4.50c., Pittsburgh, but this means indefinite delivery. For delivery this year, an Eastern mill continues to accept a little business at 6.189c., Chicago, but there is not much demand at this level. Jobbers' quotations are unchanged. For material out of warehouse jobbers quote 5c. The American Bridge Co. has booked the following tonnages:

Steel for Fourth Street viaduct, Kansas City, Mo., 358 tons.

Morgan Street subway, Steelton, Minn., for Spirit Lake Transfer Railway Co., 347 tons.

Benzol recovery plant at Steelton, Minn., for Minnesota Steel Co., 300 tons.

**Bars.**—Mild steel bars are as scarce as ever. The only open quotation is 4.50c., Pittsburgh, or 4.689c., Chicago, with few seekers for them at this price. It is felt that some of the agricultural implement makers would buy if the mills would accept their orders, as not all of this industry are covered to its full desire. Most of the manufacturers, however, are inclined to go slow, especially in buying into next year. Incidentally, some of them feel that they were too slow in advancing their prices, and thereby failed adequately to protect themselves against high prices for raw materials and a possible slump with expensive material on their hands. Iron bars are in fair demand at 4.50c. to 5c., Chicago. Rail carton bars are quoted at 4c. to 4.50c., with business not of the rushing kind, although the makers have plenty of orders on their books. The lessening of building operations is having its effect here, too. Jobbers' quotations are unchanged.

We quote prices for Chicago delivery as follows: Soft steel bars, 4.50c.; bar iron, 4.50c. to 5c.; reinforcing bars, 4.50c., base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent to plus 10 per cent.

**Wire Products.**—Under the restrictions imposed by the leading producer, new business is gradually growing lighter and unfilled orders fewer, this being the object sought. Specifications against contracts are active. It is asserted that consumers are getting all they need, and jobbers and retailers all they can legitimately sell. The demand for spikes such as are used in shipbuilding, lumber camps and mines is huge and beyond the capacity of the makers to fully satisfy, and for these premium prices are easily obtainable. While independent wire mills ask 4c. and upward for wire nails, the leading interest has made no change in its quotation of 3.20c., Pittsburgh, at which level it is supplying its customers. We quote on the basis of 4c., Pittsburgh, for nails, per 100 lb. to jobbers as follows:

Plain fence wire, Nos. 6 to 9, base, \$4.189; wire nails, \$4.189; painted barb wire, \$4.339; galvanized barb wire, \$5.039; polished staples, \$4.339; galvanized staples, \$5.039; all Chicago, carload lots.

**Rails and Track Supplies.**—Nothing has come to



light so far as the railroads are concerned. Their immediate wants are covered, and the mills are not disposed to go far into the future. The quotations of the leading interest, given below, are nominal, and independent makers quote higher. For standard railroad spikes, for example, they ask 5c., and for track bolts with square heads, 6c. to 6.25c.

Quotations are as follows: Standard railroad spikes, 4.25c. base; small spikes, 4.50c., base; track bolts with square nuts, 5.25c., all in carloads, Chicago; tie plates, \$70 to \$90 f.o.b. mill, net ton; standard section Bessemer rails, Chicago, \$38, base; open hearth, \$40; light rails, 25 to 45 lb., \$65; 16 to 20 lb., \$66; 12 lb., \$67; 8 lb., \$68; angle bars, 3.25c., base.

**Bolts and Nuts.**—Makers note a decided falling off in new business, but this is no cause of uneasiness in view of the filled-up condition of their order books. They see a general tendency on the part of large consumers to await developments. For prices and freight rates see finished iron and steel, f.o.b. Pittsburgh, page 289.

Store prices are as follows: Structural rivets, 5.50c.; boiler rivets, 5.60c.; machine bolts up to  $\frac{3}{8}$  x 4 in., 40-10; larger sizes, 35-5; carriage bolts up to  $\frac{3}{8}$  x 6 in., 40-2 $\frac{1}{2}$ ; larger sizes, 30-5; hot pressed nuts, square, \$3, and hexagon \$3 off per 100 lb.; lag screws, 50 per cent off.

**Sheets.**—Manufacturers who have had difficulty in procuring export licenses for plates, shapes and bars, have encountered no such trouble in regard to sheets, and it is reported that these are a little easier. Some of the Government requirements, especially that for army field stoves, are believed to have been cared for. Local makers have booked orders for occasional carloads at 8.50c. to 9c., Pittsburgh, or 8.689c. to 9.189c., Chicago, for No. 10 blue annealed, and 8.75c. to 9c., Pittsburgh, or 8.939c. to 9.189c., Chicago, for No. 28 black. Galvanized sheets are about 10c. to 11c. Jobbers who are now disposing of material purchased at higher levels have advanced their quotations  $\frac{1}{2}$ c.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 10c.; No. 28 black, 10c., and No. 28 galvanized, 11.50c.

**Old Material.**—The market continues to soften, and for a time it probably will drift in this direction, after which, in the opinion of some of those most interested, it will pick up slowly as the mills find it is necessary to become more active. At present, they are doing but little buying. The Eastern market is stronger, relatively, than that here. Average railroad offerings are made by the C., B. & Q., North Western, Pennsylvania and Soo Lines. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$40.50 to \$41.50
Relaying rails	59.50 to 60.00
Old carwheels	30.50 to 31.50
Old steel rails, rerolling	40.00 to 41.00
Old steel rails, less than 3 ft.	41.00 to 43.00
Heavy melting steel scrap	29.00 to 31.00
Frogs, switches and guards, cut apart	29.00 to 31.00
Shoveling steel	27.00 to 29.00
Steel axle turnings	21.00 to 22.00

Per Net Ton	
Iron angles and splice bars	\$39.00 to \$40.00
Iron arch bars and transoms	41.00 to 42.00
Steel angle bars	32.00 to 33.00
Iron car axles	44.00 to 45.00
Steel car axles	44.00 to 45.00
No. 1 railroad wrought	33.50 to 34.50
No. 2 railroad wrought	30.50 to 31.00
Cut forge	30.00 to 31.00
Pipes and flues	22.00 to 23.00
No. 1 bushelling	25.00 to 26.00
No. 2 bushelling	18.00 to 19.00
Steel knuckles and couplers	41.00 to 42.00
Steel springs	42.50 to 43.00
No. 1 boilers, cut to sheets and rings	20.50 to 21.00
Boiler punchings	34.50 to 35.00
Locomotive tires, smooth	50.00 to 50.50
Machine-shop turnings	16.50 to 17.50
Cast borings	16.50 to 17.50
No. 1 cast scrap	27.00 to 28.00
Stove plate and light cast scrap	16.50 to 17.50
Grate bars	18.00 to 19.00
Brake shoes	18.00 to 19.00
Railroad malleable	23.00 to 29.00
Agricultural malleable	23.75 to 24.75
Country mixed scrap	14.00 to 16.00

**Cast-Iron Pipe.**—Government purchases, several of which are outside of this territory, are notable, considerable quantities being wanted for cantonments at San Antonio and Fort Worth, Tex., and Atlanta, Ga. It also is probable that about 400 tons will be wanted

for the naval training station at Great Lakes. The makers are doing a fair business in industrial lots. Whitefish Bay, Wis., is about to let 400 tons, and Lincoln, Neb., will let 300 tons, Aug. 1. Quotations are unchanged.

Quotations per net ton, Chicago, are as follows: Water pipe, 4 in., \$68.50; 6 in. and larger, \$65.50, with \$1 extra for class A water pipe and gas pipe.

## Philadelphia

PHILADELPHIA, July 30.

Business in iron and steel is marking time. Buyers are evidently waiting to see what will be done in Washington with regard to establishing prices, and the result has been an exceedingly dull week as far as new business is concerned. Export inquiry has likewise fallen off, but with mills and furnaces sold far ahead there has been no adverse effect on prices. In fact, the trade at large is rather glad of the opportunity given by the lull to take an account of stock and get some kind of a line on the future during the breathing spell. With exceptions in some special lines, there has been no heavy specification on Government account in this district during the week, but such specification as has been given has had the effect of still further hampering delivery on civilian orders. That the present slowing down in new business has had no effect on the mills may be gathered from the fact that an inquiry for upward of 6000 tons of material, intended for the repair of locomotives in England, with a 30-day time limit on delivery to the purchaser in this country, was declined here.

**Pig Iron.**—Trading has been light during the week, and has been non-existent among the steel-making irons, but prices are holding firm. Inquiries are for small lots in the foundry grades, and while there is more or less talk of re-sale iron and its effects, there have been transactions in eastern Pennsylvania No. 2 X on a basis of \$54, furnace. In no instance have tonnages been heavy, and there does not appear to be any anxiety to sell even at the prices obtainable. As high as \$55, furnace, is being asked for No. 2 X for prompt shipment, with \$53 set by one interest to-day as its quotation for 1918 iron. There has been a small movement in Virginia No. 2 X at a price of \$52.50, furnace, this quotation being up to the standard maintained of late despite the fact that a considerable tonnage of Virginia iron is said to be available for re-sale. This iron was bought on Swedish account and stored in Southern ports, but it is said the owners despair of getting export licenses. Gray forge has figured in no transactions, while basic is held at a nominal price of \$52 and standard low phosphorus maintains its nominal price of \$90. Small lots of special iron, silicon 3.50 per cent and over, have been sold at \$56, furnace. Standard brands are quoted about as follows for prompt shipment, delivery in buyers' yards:

Eastern Penna. No. 2 X foundry	\$53.00 to \$55.75
Eastern Pennsylvania No. 2 plain	52.75 to 55.25
Virginia No. 2 X foundry	54.25 to 55.25
Virginia No. 2 plain	53.75 to 54.75
Basic	50.00 to 52.00
Standard low phosphorus	90.00

**Ferroalloys.**—Ferromanganese is firm at \$400, a price set by transactions to-day which is the minimum for prompt shipment in this market. There have been reports of re-sale ferromanganese being held at \$375, but there is no confirmation of this in the trade. Spiegeleisen seems somewhat easier, with \$80, furnace, being asked for prompt and with inquiries for about 5000 tons in this market. Quotations of \$225 to \$250 are given on 50 per cent ferrosilicon, prompt or last quarter, with \$130 for 1918 delivery.

**Coke.**—Spot furnace coke was quoted to-day at \$10 to \$11, with foundry coke a little below the figure of \$13.50, at which the market closed last Saturday.

**Plates.**—There has been no falling off in requests for prices and deliveries in this market, and one large maker reports total orders for this month well in excess of mill capacity for the month. The market is strong, with 10.159c., Philadelphia, the minimum for tank steel. No sales of boat plates were reported for

the week, but the nominal price is still 12½c., base, mill. There have been some Government specifications on plates during the week, and some buyers have been showing interest in 1918 delivery. The way of the civilian buyers, however, remains hard. One order of considerable size was offered to a leading maker, with a fancy price stipulated for September delivery, but it was rejected. Several good lots of tank steel have been in demand, and 11c., base, Pittsburgh, delivery at mill's convenience, was offered, only to be turned down. At least some of this business would have been taken on, were it not for the demands of the Government, but Government work is having absolute right of way in the plate mills.

**Structural Material.**—Three of the largest makers report no business this week, but Government orders from time to time continue to complicate delivery on civilian orders long booked. Mills in this district are getting 5¼c. for such material as they have in stock, and one interest has been selling as high as 6c.

**Sheets.**—Considerable Western inquiry for sheets, notably from automobile makers, is reported here, with no sales during the week. Sheet capacity, like plate capacity, is giving right of way to the Government, though it is possible that an old customer might get limited consideration now and then on a basis of 8¼c., Pittsburgh, for No. 10 blue annealed.

**Iron and Steel Bars.**—Soft steel bars are at a minimum of 4¼c., Pittsburgh, with some sales reported as high as 5c. Makers of bar iron maintain a price of 5c., Pittsburgh, with delivery at mill convenience. Expansion in shipbuilding has created a brisk demand for bars in this market.

**Old Material.**—Steel mills are not buying, and the market is inactive, with little change in quotations. A considerable volume of scrap is moving now as the result of previous transactions. One effect of the recent rise in the old materials market was the cleaning out of many years' accumulation in towns and villages within 150 miles of Philadelphia, the high prices making it worth while for collectors to visit remote points and gather in scrap iron and steel which would be neglected under ordinary conditions. It is safe to say that eastern Pennsylvania has been combed as never before. In contrast to conditions which prevailed a month ago, the old materials market is now in a state of watchful waiting. Prices per gross ton, delivered in eastern Pennsylvania territory, are about as follows:

No. 1 heavy melting steel.....	\$32.00 to \$33.00
Old steel rails, rerolling.....	45.00 to 47.00
Low phosphorus heavy melting.....	45.00 to 50.00
Old iron rails.....	45.00 to 47.50
Old carwheels.....	35.00 to 38.00
No. 1 railroad wrought.....	45.00 to 50.00
No. 1 forge fire.....	23.00 to 24.00
Bundled sheets.....	23.00 to 24.00
No. 2 busheling.....	16.00 to 17.00
Machine shop turnings (for blast furnace use).....	19.00 to 20.00
Machine shop turnings (for rolling mill use).....	22.00 to 23.00
Cast borings (for blast furnace use).....	19.00 to 20.00
Cast borings (clean).....	23.00 to 25.00
No. 1 cast.....	35.00 to 38.00
Grate bars.....	21.00 to 22.00
Stove plate.....	22.00 to 23.00
Railroad malleable.....	32.50 to 35.00
Wrought iron and soft steel pipe (new specifications).....	34.00 to 35.00

## Cincinnati

CINCINNATI, July 31—(By Wire).

**Pig Iron.**—A northern Ohio melter bought 1000 tons of Southern iron for this year's shipment at the full schedule. This is the largest sale reported in several weeks. Buying continues to be mostly for small lots of prompt foundry iron, and if the absence of inquiries indicates anything, there will be no immediate change in the present dull situation. Consumers are taking no interest at all in next year's requirements. Northern foundry, basic and malleable are stagnant, although furnace stocks of foundry iron are practically wiped out. The furnaces are quoting \$55, Ironton, for first-half business, but are not making any strenuous efforts to obtain orders for that delivery. Coke troubles, together with hot weather, have curtailed production in a limited way in both the North and South. On the

other hand, the foundry melt is up to capacity, with the exception of a few nearby foundries shut down on account of labor troubles. The consumption of steel-making irons was never greater. A small lot of Ohio 8 per cent silvery iron for spot shipment brought \$90, but \$87 can be done. Shipments of Southern iron are not moving fast enough to suit many customers, but no plants have been forced to shut down for want of iron. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, for 1917 shipment, as follows:

Southern coke, No. 1 f'dry and 1 soft.....	\$51.40 to \$52.40
Southern coke, No. 2 f'dry and 2 soft.....	49.90 to 50.90
Southern coke, No. 3 foundry.....	49.40 to 50.40
Southern coke, No. 4 foundry.....	48.90 to 49.90
Southern gray forge.....	48.90 to 49.90
Ohio silvery, 8 per cent silicon.....	87.26 to 91.26
Southern Ohio coke, No. 1.....	56.26 to 57.26
Southern Ohio coke, No. 2.....	56.26 to 57.26
Southern Ohio coke, No. 3.....	55.26 to 56.26
Southern Ohio malleable Bessemer.....	56.26 to 57.26
Basic, Northern.....	56.26 to 57.26
Lake Superior charcoal.....	56.75 to 57.75
Southern carwheel foundry.....	48.90 to 49.90

(By Mail)

**Coke.**—Reports that the situation is easing up in the Connellsville field prove to be correct in only a small degree. It is true that prices quoted for prompt coke are now below last week's figures, but it is undeniably a fact that in most instances consumers are compelled to pay the maximum price in order to obtain prompt shipments. The present hot weather will have a tendency to further curtail the labor supply so that not much relief may be expected at any time soon. Some furnace coke for nearby shipment has been sold in the Buffalo district, and a few rush orders have lately been received from nearby users whose regular shipments on contracts were delayed. Connellsville 48-hr. coke for prompt shipment is around \$10 to \$11 per net ton at oven, but there are no authentic figures out that would indicate what the average quotation is for contract business. Foundry coke in the Connellsville district for spot shipment is now quoted at \$12 to \$13.50 and on contracts around \$11.50 to \$12. In the Pocahontas field, the car shortage is more acute, and foundry coke for nearby shipment ranges all the way from \$12.50 to \$14. In fact, some 72-hr. coke was sold there last week as high as \$15.50. The same condition exists in the New River field, but Wise County producers are making more even prices. However, there is not very much improvement in shipments from that field.

**Old Material.**—Reports from all sources show prices still on the downward grade, the average reduction being close to \$1 per ton on nearly all kinds of scrap. The demand for scrap is very light and dealers state that offerings are growing heavier; as a consequence, a decided weakness has developed. Some grades of scrap have been reduced as much as \$10 a ton within the past few weeks, and just at the moment there is a widening difference between the cost of scrap and pig iron. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap.....	\$19.50 to \$20.00
Old iron rails.....	34.00 to 34.50
Relaying rails, 50 lb. and up.....	45.00 to 45.50
Rerolling steel rails.....	37.00 to 37.50
Heavy melting steel scrap.....	33.00 to 33.50
Steel rails for melting.....	33.00 to 33.50
Old carwheels.....	30.00 to 30.50

Per Net Ton	
No. 1 railroad wrought.....	\$32.50 to \$33.00
Cast borings.....	13.00 to 13.50
Steel turnings.....	13.00 to 13.50
Railroad cast.....	23.00 to 23.50
No. 1 machinery cast.....	24.00 to 24.50
Burnt scrap.....	14.50 to 15.00
Iron axles.....	43.00 to 43.50
Locomotive tires (smooth inside).....	36.00 to 36.50
Pipes and flues.....	17.50 to 18.00
Malleable cast.....	24.50 to 25.00
Railroad tank and sheet.....	15.50 to 16.00

**Finished Material.**—The mill business is slack and local representatives are devoting their time principally in aiding customers to get forward shipments on time. Specifications on old contracts are urgent in some cases, and it is frequently necessary to split up these requisitions and divide the material among different customers. The jobbers state that, considering the season of the year, they could not hope for a better business. The



local store price are unchanged as follows: Wire nails, \$3.90 per keg, base; steel bars, 5c., base; twisted steel bars, 5.05c.; structural shapes, 5.25c.; 1/4-in. plates and heavier, 9 1/2c.; cold-rolled shafting, list plus 15 per cent; machine bolts, 3/4 x 4 in. and smaller, 45 per cent discount, larger and longer, 30 per cent discount; round head steel rivets, 5.05c., base; cone head rivets, 5.06c., base. The nominal mill quotation on No. 28 galvanized sheets is unchanged at 10.65c., Cincinnati or Newport, Ky., and on No. 28 black sheets, 8.65c.

## Birmingham

BIRMINGHAM, ALA., July 31.—(By Wire).

Very little buying of pig iron is taking place and prompt sales average \$50 and over with a small amount of resale under that. For limited trade, furnace interests hold 1917 iron at \$50 and 1918 at \$48. There is no apparent inclination to mark down on any delivery.

(By Mail)

The iron masters of the Birmingham district appeared to be more nearly of one opinion as to the iron market at the close of the last week in July than in some time. It was agreed that \$48 was the basis for 1918 and \$50 for 1917. The leading interest joined these, asking \$48 for 1918, and there was nothing heard of prices under that. A customer who found himself overloaded offered lots of several hundred tons for resale. His price was \$50. All furnaces, when asked for prompt iron by brokers and others, quote \$50 and over. The only iron under \$50 heard of is some resale metal which missed connections at ports and is available for a limited territory. Some of that, it is understood, has sold at as low as \$46, while other lots brought \$47 to \$50. This resale metal does not represent the market and must be regarded as exceptional. Three per cent silicon has sold at \$51. The leading foundry iron seller has turned out considerable high silicon metal. Very little business is transacted, but, as has already been noted, furnace interests, which are well sold from now through the first quarter of 1918, have no reason to shade prices. It is reported that a number of St. Louis territory consumers are not well provided with iron for first quarter of 1918 and are uneasy. Furnaces quote per gross ton for prompt delivery, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft.....	\$50.50 to \$51.50
No. 2 foundry and soft.....	50.00 to 51.00
No. 3 foundry .....	49.50 to 50.50
No. 4 foundry .....	49.25 to 50.25
Gray forge .....	49.00 to 50.00
Basic .....	50.00 to 51.00
Charcoal .....	55.00 to 56.00

**Cast-Iron Pipe.**—Pipe shops divide the cantonment orders according to availability of different shops as to sizes, the army board deciding the quotas. This rush business served to postpone other manufacture, so that shops report orders ahead for about 90 days. We quote per net ton, f.o.b. pipe shop yards, as follows: 4 in., \$63; 6 in., \$60, with \$1 added for gas pipe and special lengths.

**Coal and Coke.**—Miner disaffections at mines were of short duration. Government maximum prices prevail at mines, which makes big seam steam coal bring \$3, f.o.b. mines. Coke movements to Texas, Mexico and the Pacific coast are going on with some regularity. Furnace coke sells at \$8, and spot foundry, when obtainable, brings \$14.

**Old Material.**—The scrap market continues its downward trend. All prices are down from \$1 to \$3. Consumers name terms at which deals are made. We quote per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles .....	\$50.00 to \$51.00
Old steel rails .....	25.00 to 26.00
No. 1 wrought .....	23.00 to 29.00
No. 1 heavy melting steel.....	18.00 to 19.00
No. 1 machinery cast .....	22.50 to 23.00
Carwheels .....	25.00 to 25.50
Tram carwheels .....	23.00 to 23.50
Stove plate and light .....	16.00 to 17.00
Turnings .....	11.00 to 12.00

**Steel Bars.**—Steel bars, f.o.b. Birmingham in carlots, 4.75c. to 5.00c.; iron bars, 4.40c. to 4.60c.

## St. Louis

ST. LOUIS, July 30.

**Pig Iron.**—While there has been comparatively little buying of pig iron during the week and almost as little inquiry, there has been no disposition on the part of furnaces, according to representatives, to lower their prices and in consequence the quotations remain as at last report so far as can be ascertained in a market in which no transactions are taking place. One sale of 600 tons of charcoal carwheel iron was reported and an inquiry for three carloads of ferromanganese constitute the chief item of interest during the week, the rest of the sales being of carload lots for special needs or purposes. One interesting development of the week, however, was a tendency on the part of some foundries which have bought in excess of actual requirements to put their surplus pig on the market, but not at prices calculated to break quotations. No. 2 Southern foundry is generally held at \$49 per ton, Birmingham, or better, with no spot iron available and furnaces unwilling to commit very heavily at the price named.

**Coke.**—No contract coke is available in this market, the ovens having maintained their determination not to sell far in advance. Sales for spot or early delivery are being made in small lots at \$12.50 to \$13, Connellsville, for best selected 72-hr. ceke. By-product is being sold, when transactions appear, on the same basis.

**Finished Iron and Steel.**—In finished products, the situation is chiefly one of urging forward deliveries on material already contracted for, but even this is decreasing, as customers realize that the Government is the cause of the further deferment of delivery and there is little use in trying to overcome the situation. The warehouses are being swept bare of the most wanted material and demand is well beyond ability to deliver needed finished material, regardless of the prices quoted. Warehouse prices follow: Soft steel bars, 4.55c.; iron bars, 4.50c.; structural material, 5.25c.; tank plates, 8.05c.; No. 10 blue annealed sheets, 10.05c.; No. 28 black sheets, cold rolled, one pass, 10.35c.; No. 28 galvanized sheets, black sheet gage, 11.75c.

**Old Material.**—The situation in the scrap market continues with the dealers marking time and rather inclined, considering the season of the year, to let things rest until there is a more definite readjustment of the situation and a real demand on the part of consumers for material. Lists include about 12,000 tons from the Baltimore & Ohio and 2000 tons from the Chicago, Burlington & Quincy. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

	Per Gross Ton
Old iron rails .....	\$38.00 to \$38.50
Old steel rails, re-rolling.....	40.00 to 40.50
Old steel rails, less than 3 ft.....	39.00 to 40.00
Relaying rails, standard section, subject to inspection .....	50.00 to 51.00
Old carwheels .....	30.50 to 31.00
No. 1 railroad heavy melting steel scrap .....	31.00 to 31.50
Heavy shoveling steel .....	27.00 to 27.50
Ordinary shoveling steel.....	26.00 to 26.50
Frogs, switches and guards cut apart .....	32.00 to 32.50
Ordinary bundled sheet scrap.....	18.50 to 19.00
Heavy axle and tire turnings.....	22.00 to 22.50

	Per Net Ton
Iron angle bars .....	\$35.00 to \$35.50
Steel angle bars .....	30.00 to 30.50
Iron car axles .....	41.00 to 41.50
Steel car axles .....	40.00 to 40.50
Wrought arch bars and transoms.....	39.00 to 39.50
No. 1 railroad wrought .....	33.00 to 33.50
No. 2 railroad wrought .....	31.00 to 31.50
Railroad springs .....	30.00 to 30.50
Steel couplers and knuckles .....	38.00 to 39.00
Locomotive tires, smooth inside, 42 in. and over .....	38.00 to 39.00
No. 1 dealers forge .....	24.00 to 24.50
Cast iron borings .....	14.00 to 14.50
No. 1 busheling .....	24.00 to 24.50
No. 1 boilers cut to sheets and rings.....	20.50 to 21.00
No. 1 railroad cast scrap .....	20.50 to 21.00
Stove plate and light cast scrap.....	16.50 to 17.00
Railroad malleable .....	27.00 to 27.50
Agricultural malleable .....	22.00 to 22.50
Pipes and flues .....	19.50 to 20.00
Heavy railroad sheet and tank scrap.....	18.00 to 18.50
Railroad grate bars .....	17.50 to 18.00
Machine shop turnings .....	14.00 to 14.50
Country mixed scrap .....	14.00 to 15.00

## Cleveland

CLEVELAND, July 31.

**Iron Ore.**—As a result of efforts of I. W. W. agitators, strikes have been declared at two mines on the Gogebic range. Handbills are being distributed among the miners urging them to strike for a six-hour day and \$6 pay. However, the miners are reported to be generally satisfied with their present wages and mine operators apparently do not feel that the efforts of the I. W. W. to induce the men to quit work will make very much headway. The car supply at the lower Lake docks has improved somewhat, so that boats are not being delayed so long to unload cargoes as they were during the early part of the month. We quote prices as follows, delivered lower Lake ports: Old range Bessemer \$5.95; Mesaba Bessemer, \$5.70; old range non-Bessemer \$5.20; Mesaba non-Bessemer, \$5.05.

**Pig Iron.**—The market is still dull, although a slight improvement in the demand has sprung up as compared with the two previous weeks. This is wholly in foundry grades, no inquiry having come out for steel-making iron. One seller reports a sale of several lots, aggregating 3000 tons. In this immediate territory no sales of any grade are reported. In spite of the heavy volume of business booked for the first half of next year, some large consumers of foundry iron in this territory have not purchased any iron for that delivery, and are not expected to do so as long as the present uncertainty as to prices continues. While sellers generally are adhering to the policy of making \$55 the maximum on all grades, several also hold to that as their minimum; but there have not been sufficient sales to test the market. A New York furnace that started to fill an empty order book at \$50 is understood to have advanced its price to \$55 for foundry iron that goes largely into the New England territory. There is no activity in Southern iron, on which prices are unchanged at \$45 to \$50, Birmingham. We quote, f.o.b. Cleveland, as follows:

Bessemer .....	\$55.95
Basic .....	\$53.30 to 55.30
Northern No. 2 foundry .....	55.30
Southern No. 2 foundry .....	49.00 to 54.00
Gray forge .....	50.95 to 52.95
Ohio silvery, 8 per cent silicon .....	58.62
Standard low phosph. Valley furnace .....	55.00

**Coke.**—Producers continue to quote foundry coke at \$14 per net ton at oven for standard Connellsville makes in this market for prompt shipment, and several small lot sales are reported at this price. Connellsville furnace coke for prompt shipment is quoted at \$10 to \$10.50. The car supply in the Connellsville region is now satisfactory but the labor shortage is curtailing production.

**Finished Iron and Steel.**—With the exception of material for Government work inquiry is light. Among the new Government requirements is a round tonnage of light rails for use in France for building portable tracks to connect the trenches with the standard track railroad lines the United States Government will build to carry supplies to the American army, following in general plan the French system of portable track which has taken a large tonnage of American light rails. Export as well as domestic inquiry for plates is heavy in spite of the export embargo which has unsettled the plate market. Some makers are avoiding taking export orders under present conditions, and unless licenses are issued soon for plates previously sold for export considerable of this export tonnage will probably be offered to the American trade, and this would doubtless result in some easing up in prices. In fact, the plate market is not as firm as it has been. While local mills continue to quote plates at 10c., Pittsburgh, the market seems to have settled down to a price range of 9c. to 10c. A late interpretation from Washington of the embargo is that light plates, No. 12 gage and lighter, are not covered by the embargo. There is a fair demand for small lots of structural material, mostly for factory additions for early delivery. Fabricators are securing this material almost wholly from jobbers at stock prices. Several local quotations have been made on forging billets at \$125 at mill. There is a moderate

demand for iron bars which are quoted at 4.75c. to 5c., Cleveland. We quote hard steel bars at 4.50c., Cleveland. Inquiry for sheets, which quieted down because of a possibility of the regulation of prices for domestic consumers, has become somewhat more active. Some inquiry has come out for first quarter contracts. Considerable tonnage has been placed for stoves for Government cantonments. Sheet prices are somewhat easier, owing to the fact that some jobbers are offering their stocks at lower prices than are being quoted by the mills, these jobbers' prices being 8.50c. for black and blue annealed, 10.50c. for galvanized. We quote mill prices at 9c. to 9.50c. for No. 28 black, 8.50c. to 9c. for No. 10 blue annealed, and 10.50c. to 11c. for No. 28 galvanized. Warehouse prices are 5c. for steel bars, 5.25c. for structural material, 9c. for plates and 8.50c. to 9c. for blue annealed sheets.

**Bolts, Nuts and Rivets.**—There is a heavy demand for bolts and nuts, an increasing volume of business coming out from manufacturers having Government orders. The hot weather is seriously curtailing the output, as many men are refusing to work. The demand for rivets is quiet, both in specifications and new orders. We quote rivets at 5.25c., Pittsburgh, for structural, and 5.35c. for boiler rivets. Bolt and nut discounts are as follows, round lot buyers being allowed 5 to 10 per cent discount from these prices:

Common carriage bolts,  $\frac{3}{8}$  x 6 in., smaller or shorter, rolled thread, 35 off; cut thread, 30 and 5, larger or longer, 20. Machine bolts, with h. p. nuts,  $\frac{3}{8}$  x 4 in., smaller or shorter, rolled thread, 40; cut thread, 35; larger and longer, 25. Lag bolts, cone point, 40. Square h. p. nuts, blank, \$1.90 off list; tapped, \$1.70 off list. Hexagon, h. p. nuts, blank, \$1.70 off; tapped, \$1.50 off. C. p. c. and t. hexagon nuts, all sizes blank, \$1.25 off; tapped, \$1 off. Cold pressed semi-finished hexagon nuts, 50 and 5 off.

**Old Material.**—The market is inactive, but a slightly firmer tone has developed. Prices are lower on some forms of scrap that did not move down as rapidly as the more active grades during the recent sharp decline, but for the most part quotations of a week ago are maintained. None of the mills is actively in the market for scrap, practically all the transactions being between dealers. In some cases there is a wide range in prices. Sales of heavy melting steel are reported all the way from \$30 to \$35. Considerable irregularity exists in prices of busheling scrap. A 200-ton lot brought \$28.25 per net ton in a transaction between dealers in this market last week. Other sales were made at \$26 and higher, and one Cleveland dealer is now offering \$28 for this grade to cover short sales made at considerably higher prices. Dealers claim that, owing to the scarcity of labor, considerable scrap usually sheared up into busheling is either sold as heavy melting steel or the lighter material goes to the mills as bundled sheet scrap. Cast scrap is very dull and weak. Dealers are looking for some recovery in prices when the market again becomes active but do not expect that they will reach the recent high levels. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails .....	\$31.00 to \$32.00
Steel rails, rerolling .....	45.00 to 46.00
Steel rails, under 3 ft. ....	39.00 to 40.00
Iron rails .....	43.00 to 44.00
Steel car axles .....	50.00 to 52.00
Heavy melting steel .....	32.00 to 33.00
Carwheels .....	32.00 to 33.00
Relaying rails, 50 lb. and over .....	50.00 to 55.00
Agricultural malleable .....	24.00 to 25.00
Railroad malleable .....	31.00 to 32.00
Light bundled sheet scrap .....	24.00 to 25.00
Per Net Ton	
Iron car axles .....	\$47.00 to \$49.00
Cast borings .....	17.50 to 18.00
Iron and steel turnings and drillings .....	17.00 to 17.50
No. 1 busheling .....	25.00 to 26.00
No. 1 railroad wrought .....	42.00 to 43.00
No. 1 cast .....	29.00 to 30.00
Railroad grate bars .....	21.50 to 22.00
Stove plate .....	20.00 to 21.00

The American Steel & Wire Co. is to erect two new buildings and two additions at its works at Fair Haven, Conn. The largest building will be a rope mill 88 x 363 ft., one story. The other building will be a hemp storage 48 x 100 ft., one story. An addition to an existing building will be 50 x 125 ft., one story, and an additional story will be added to another building 60 x 223 ft. The extensions will be used for work formerly done at the Worcester plants of the company.



## Buffalo

BUFFALO, July 31.

**Pig Iron.**—The market continues very quiet with only a small total of orders amounting to not more than 1000 tons for the district for the week. Inquiry is at low ebb, buyers maintaining a waiting attitude. Producers welcome the cessation in inquiry and buying, as furnace capacity is practically all taken for months ahead and because of averseness to binding themselves to far future commitments at present owing to uncertainties regarding coming costs of raw materials and the question of ability to produce 100 per cent of capacity. Prices remain unchanged, and the limited sales made during the week have been made on the basis of \$55, furnace, for average foundry grades, and \$57 to \$58 for the higher silicon grades, mostly for this year's delivery. For 1918, first quarter and half, we quote as follows, f.o.b. furnace, Buffalo:

High silicon irons	\$55.00 to \$56.00
No. 1 foundry	54.00 to 55.00
No. 2 X foundry	53.00 to 55.00
No. 2 plain	52.00 to 54.00
No. 2 foundry	51.00 to 53.00
Gray forge	51.00 to 53.00
Malleable	54.00 to 55.00
Basic	54.00 to 55.00
Lake Superior charcoal, f.o.b. Buffalo.	55.00 to 60.00

**Finished Iron and Steel.**—Liberal shipments are being made against tonnage on mill books. In many instances, shipments represent orders that were placed in 1915 and early 1916. This specially applies to plate tonnages. Mills continue to make more effort to ship material than to book new business. In fact, the general policy of mills and agencies continues—as has been reported for the past couple of weeks—to be that of refraining from encouraging the placing of additional business; and buyers, as well as sellers, are pursuing this "sit tight" policy. The prevailing open market prices on such business as is consummated on bars, shapes and plates are: For bars and shapes, 4½c., and for plates, 8½c. For cold finished steel the current price is 5 per cent off the list for carload lots; and for tin plate, "stock accumulations"—which is the only tin plate moving—\$11.50 to \$12 per base box. Bids are being received for structural steel for the new plant for the Curtiss Aeroplane & Motor Corporation, Buffalo, for which ground has just been broken, and which will require about 4000 tons.

**Old Material.**—The market is simply riding along, exhibiting about the same conditions as were in evidence last week, except that the situation has been further restricted and complicated by additional embargoes placed in effect in the Pittsburgh and Valley districts. A considerable number of the commodities of the list show a further decline in price, heavy melting steel having dropped \$1 per ton, low phosphorus and No. 1 railroad wrought \$3, iron and steel axles \$5, old carwheels \$1 to \$2, with similar recessions in some other grades. Dealers are still engaged principally in completing back orders as far as possible. A number of cancellations have been reported recently, on high-priced orders, by reason of the fact that time delivery had expired. This is turning the tables on dealers who are in the "slackers" class—most of them having contracts at the old, and lower figures—on which they were not making deliveries. There is a coincidence of opinion by most dealers that the market is likely to drag along in its present condition for some time, as there are no indications of a buying movement setting in or an increase in prices in the immediate future. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$33.00 to \$34.00
Low phosphorus	45.00 to 48.00
No. 1 railroad wrought	43.00 to 45.00
No. 1 railroad and machinery cast	30.00 to 31.00
Iron axles	45.00 to 50.00
Steel axles	45.00 to 50.00
Carwheels	33.00 to 36.00
Railroad malleable	30.00 to 31.00
Machine shop turnings	18.00 to 19.00
Heavy axle turnings	26.00 to 27.00
Clean cast borings	20.00 to 21.00
Iron rails	43.00 to 44.00
Locomotive grate bars	20.00 to 21.00
Stove plate	20.50 to 21.00
Wrought pipe	30.00 to 31.00
No. 1 busheling scrap	29.00 to 30.00
No. 2 busheling scrap	20.00 to 21.00
Bundled sheet stamping scrap	21.00 to 21.50

## New York

NEW YORK, Aug. 1.

**Pig Iron.**—While the pig iron market is extremely quiet, a better feeling exists than prevailed during the preceding two weeks. Prices are showing some tendency to recede, but for the most part are well maintained. Very little Alabama iron is to be had and the car situation shows little change. Some buyers of iron in Alabama have not been able to obtain deliveries, which are now three, four and even more months in arrears. Pennsylvania irons are somewhat easier. There is very little active inquiry, the principal one being from a Brooklyn foundry for 500 tons for the first half of next year and the same tonnage for the last half. For Pennsylvania No. 2 X, \$52, furnace, can be done, but \$53 is more frequently asked. Heavy tonnages still are pending for export. Some new foreign inquiries have appeared. Licenses for export are being issued very slowly, and are limited to 60 days, so that no sales are being made for delivery after that period. We quote tidewater for prompt delivery as follows:

No. 1 foundry	\$53.25 to \$54.25
No. 2 X	52.75 to 53.75
No. 2 plain	52.50 to 53.50
Southern No. 1 foundry	52.75 to 53.75
Southern No. 2 foundry and soft	52.25 to 53.25

**Ferroalloys.**—The market is inactive, despite the fact that the prospect for adequate supplies, due to dwindling imports, is not as good as it has been. Some little concern is beginning to be apparent here and there, but there is not much inquiry either for this year's or next year's delivery. It is reported that licenses are growing increasingly difficult to obtain, and it is already evident that receipts in July have been no better than those for May and June, or less than 3,000 tons for the month. Because of the recommendation of the Alloy Committee of the Council of National Defense referred to elsewhere, that ferromanganese supplies be conserved as much as possible, and that the more liberal use of spiegeleisen be resorted to, rather large inquiries for spiegeleisen have appeared within the last week. One consumer is asking for 2000 to 2500 tons for delivery this year, and two other consumers are seeking 1000 tons each for the same delivery, while another is a prospective buyer of 1000 tons, making a total of 3000 to 3500 tons actually before the market. For delivery this year \$85 furnace is the quotation and the market is strong. Ferrosilicon, 50 per cent, is reported to be scarce for delivery this year at \$200 per ton, the quotation for delivery next year still standing at \$130. One British representative of a maker of ferromanganese who has made some sales recently reports that his principal is not anxious to take further orders.

**Structural Material.**—Government contracts and plant extensions made necessary by Government munitions and other work continue to be the only business that is attracting any attention, with the possible exception of mandatory railroad bridge and other construction. The total is not large and the market is quiet. The 12,000 tons required for the Federal Shipbuilding Co.'s plant, to be built for the Steel Corporation near Newark, N. J., will be furnished by the American Bridge Co. The Ingersoll-Rand Co. has awarded 150 tons for a plant extension and the Milliken works will furnish 600 tons for an extension to the Chile Copper Works in South America on an order taken by the Downey Shipbuilding Corporation. The Auto Car Co. has awarded 400 tons to Morris Wheeler, Philadelphia, for a machine shop at Ardmore, Pa. The Downey Shipbuilding Corporation will require 4000 tons for shipways and buildings. The lowest bidder for 600 tons for bridge work for the Pennsylvania Railroad is the Phoenix Bridge Co., and the same buyer is in the market for about 500 tons for bridges. The Boston & Albany is inquiring for 200 tons for two bridges and the Boston Elevated Railroad has awarded 125 tons for a car house at Sullivan Square. Various companies are reported as making tentative inquiries for plant extensions. We quote plain material from mill at 4.669 to 5.169c., New York, the lower price in three to four months and the higher for small lots in earlier deliveries. Shipments from warehouses are 5c. to 5.25c. per pound, New York, according to sizes desired.

**Rails and Track Supplies.**—For the purpose of building a comprehensive railroad system back of the battle lines in France for the support of the American army which will soon be in the field, the United States Government has placed orders for 150,000 tons of 80-lb. steel rails and correspondingly large tonnages of angle bars, bolts, etc. The rail order has been divided among the four leading producers, the largest interest, it is understood, taking about two-thirds. The Government apportioned the order according to the rail-producing capacity of the plants and the price was fixed at \$40 per ton for open hearth and \$38 for Bessemer rails, the mills being given the option as to which kind they shall furnish. Angle bar orders were placed at 3.25c. and bolts at 5.50c. In addition several large orders were placed with manufacturers of frogs and switches and the rails required for the turnouts were in addition to the 150,000 tons. Preference is to be given to these orders by the mills, as the Government requires prompt delivery. There is said to be a prospect that a leading producer will take on all or a part of an order for 130,000 tons of rails for the Russian Government. This inquiry has been in the market for three or four months and difficulty has been experienced in finding a mill that would accept it.

**Plates.**—July was a very active month in all finished steel, especially for export, and plates easily took the lead in tonnages placed in this market. New business has now dropped off practically to nothing, although the Japanese are still anxious to buy. A few orders have been accepted for Japanese shipment during the past week, but the majority of the mills prefer not to place any more of this business on their books until the export license situation has been cleared up. There are at present thousands of tons of plates and shapes awaiting shipment and with the exception of the release of a few small lots, none of this has been moved even to seaboard since the embargo went into effect. Various lots of plates for England, France, Italy and Russia have gone forward without objection. There are indications that a strong effort will be made, when the Japanese Commission arrives, to secure the transfer of some Japanese vessels to the Atlantic. All of the plates for France, about 50,000 to 60,000 tons, have been placed, and first shipments have already been made. As mentioned last week, 6c. was paid for hull steel, but orders for boiler plates were placed at two prices, 8.50c. and 9c., the 8.50c. price being that fixed for the larger producers. France has bought a considerable quantity of shapes out of stock and was apparently glad to get them, its needs being urgent. Car business shows more activity. It is understood that the United States Government is inquiring for cars for shipment to France as a part of its general railroad program for the war. The South Buffalo Railway is reported to have ordered 300 steel hopper cars from the American Car & Foundry Co. and the Bessemer & Lake Erie Railroad is reported to have ordered 1500 70-ton hopper cars from the Ralston Steel Car Co. The Semet-Solvay Co., Syracuse, N. Y., wants 100 hopper cars, the New York, New Haven & Hartford Railroad is said to be inquiring for 50 refrigerator cars and the Long Island Railroad may buy 25 passenger and baggage cars and 40 coaches. Sellers' views on plates are firm on the basis of 10c., Pittsburgh, for tank quality and 12c. to 12.50c. for plates rolled to Lloyds specifications, although little business is being done. On mill shipments we quote tank plates at 10.169c., New York, and ship plates, 12.169c., New York. Plates out of store at 8c. to 9c. for tank quality and 8.50c. to 9.50c. for ship steel.

**Iron and Steel Bars.**—Some of the smaller mills are said to be willing to take on business in steel bars for delivery in three to six months at 4.50c., though 5c. is being asked in most instances for fairly prompt shipment. Deliveries of bar iron are also a little easier, although a leading producer cannot do better than late in the fourth quarter of this year or the first quarter of 1918, its price for such delivery being 4.75c., Pittsburgh. We learn, however, of an offer of about 1000 tons of bar iron for delivery beginning in 30 days at 4.50c., Pittsburgh. Some producers are asking up to 5c., the latter figure seeming to represent the views of most

sellers. We continue to quote steel bars in mill shipments at 4.669c. to 5.669c., New York, and bar iron at 4.919c. to 5.169c., New York. From New York district warehouses steel bars are sold at 5c. and bar iron at 5c. to 5.50c.

**Old Material.**—With the exception of cast borings, which have advanced about \$2 and are now quoted at from \$20 to \$21, the old material market is weak, although quotations on foundry material are being well maintained. An extraordinary number of rejections are reported. There is some buying of heavy smelting steel at Steubenville, Ohio, and Midland, Pa., but very little is being taken by eastern Pennsylvania mills. Brokers quote buying prices as follows to local producers and dealers per gross ton, New York:

Heavy melting steel scrap (for shipment to eastern Pennsylvania).....	\$28.00 to \$29.00
Old steel rails (short lengths) or equivalent heavy steel scrap.....	28.00 to 29.00
Relaying rails .....	65.00 to 70.00
Re-rolling rails .....	39.00 to 40.00
Iron and steel car axles.....	42.00 to 43.00
No. 1 railroad wrought.....	41.00 to 42.00
Wrought-iron track scrap.....	32.00 to 33.00
No. 1 yard wrought long.....	32.00 to 33.00
Light iron .....	10.00 to 12.00
Cast borings (clean) .....	20.00 to 21.00
Machine-shop turnings .....	18.00 to 19.00
Mixed borings and turnings.....	16.50 to 17.00
Wrought-iron pipe (1 in. minimum diameter, not under 2 ft. long)....	31.00 to 32.00

Cast-iron scrap continues to hold its own remarkably well, but there is considerable variation in reports as to sales of No. 1 machinery cast, some dealers asserting that as low as \$32 has been accepted, while others are quoting from \$34 to \$35, and in some cases even higher. Dealers in New York City and Brooklyn are quoting as follows to local foundries per gross ton:

No. 1 machinery cast.....	\$34.00 to \$35.00
No. 1 heavy cast (column, building material, etc.) .....	29.00 to 30.00
No. 2 cast (radiators, cast boilers, etc.) .....	28.00 to 29.00
Stove plate .....	20.00 to 21.00
Locomotive grate bars.....	20.00 to 21.00
Old carwheels .....	33.00 to 34.00
Malleable cast (railroad) .....	33.00 to 34.00

**Cast Iron Pipe.**—The City of New York is in the market for 1227 tons of 6-in., 8-in. and 12-in. pipe for the Department of Water Supply, Gas & Electricity, and bids will be received Aug. 6. The city will also receive bids Aug. 7 on 145 tons for the Department of Charities. Carloads of 6-in., 8-in. and heavier are quoted \$65.50 per net ton tidewater and 4-in. at \$68.50.

### Will Finance Manufacturers

WASHINGTON, July 31.—The War Department is preparing to finance manufacturers of airplanes who are not in position to supply funds for the purchase of materials, equipment, etc., for the execution of large contracts. The aviation bill, passed by the House and signed by the President a few days ago, makes no provision for advances to manufacturers, and Section 3648 Revised Statutes specifically forbids such payments except under certain prescribed conditions which do not apply to this emergency. Many manufacturers of aircraft have valuable patents and have been building airplanes on a small scale, but lack the necessary capital to enlarge their operations and take an active part in the building program, which is counted upon to produce more than 20,000 fliers within the coming year.

To meet this emergency Representative Hulbert of New York has introduced a bill to remove the restrictions on advance payments imposed by Section 3648 Revised Statutes as they apply to the expenditure of appropriations contained in the aviation act. Quick action on this measure is looked for, and as soon as the bill is passed the War Department will be in position to place a large number of contracts which manufacturers with moderate facilities now hesitate to undertake.

The American Steel Export Company, New York, has appointed Woodburn's, Ltd., Montreal, Canada, as its exclusive agents for the provinces of Ontario and Quebec.

The Combination Lighting Unit Co., Pittsburgh, has been organized with a capital of \$350,000 to manufacture and sell all kinds of lighting fixtures.



## Metal Markets

### The Week's Prices

Cents Per Pound for Early Delivery							
Copper, New York		Tin.	Lead		Spelter		
Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis	
July							
25	26.50	26.50	62.50	10.50	10.37½	8.75	8.50
26	28.50	28.50	62.75	10.50	10.37½	8.75	8.50
27	28.50	28.50	63.00	10.75	10.62½	8.75	8.50
28	28.50	28.50	...	10.75	10.62½	8.75	8.50
29	29.00	29.00	63.75	10.75	10.62½	8.75	8.50
30	29.00	29.00	63.75	10.87½	10.75	8.75	8.50
31	29.00	29.00	63.75	10.87½	10.75	8.75	8.50

NEW YORK, Aug. 1.

The markets continue dull and more or less nominal, pending some decision as to Government price regulation and purchases. Copper is firmer and nominally higher. Tin is quiet and a little stronger. Lead is firm with a tendency upward. Spelter is inactive and nominal but steady. Antimony is dull and unchanged.

### New York

**Copper.**—After two weeks of a continuous decline the copper market late last week took a decided turn upward and has been more or less strong ever since. This bulge in prices was due to two causes: The withdrawal of resale lots and an idea that large consumers were about to purchase. As a whole the market has been more or less nominal and narrow and drifting with few actual transactions recorded. The higher quotations have really not been based on actual purchases and have been ruled not so much by supply and demand as by sentimental reasons. The quotations yesterday for both Lake and electrolytic was 29c., New York. The quotation for last quarter is generally regarded as 27.50c. to 28c., New York. The lower prices reported last week in the London market are unchanged at £137 for spot electrolytic and £133 for futures.

**Copper Averages.**—The average price for both Lake and electrolytic copper for the month of July, based on daily quotations in THE IRON AGE, was 28.78c.

**Tin.**—General business is of a halting and ragged nature and scant in volume. In the middle of last week there was a fair inquiry for far future delivery and some good business is reported to have been done for delivery in the last quarter with smaller quantities sold for early London shipment. There was but little inquiry for spot tin, however, and some price cutting was in evidence, sales of Straits tin being made as low as 62.50c. on July 25, with 62c. quoted. On July 27 buying died down and considerably less interest was shown although sales for the period made a respectable showing. Yesterday and Monday, July 30 and 31, the market was entirely uninteresting and very slow with hardly enough business reported to establish price levels. A liberal estimate of the sales on those two days was 150 tons. The quotation for spot Straits yesterday in New York was 63.75c., the market having continually advanced in the last week. The London market has shown decided strength and continued to rise last week until yesterday the quotation for spot Straits was £248, an advance of nearly £9 per ton. The arrivals up to July 31 were 2390 tons, with 3450 tons reported afloat.

**Lead.**—The intimation last week of a possible turn for the better in the market has been borne out. The market has continued to advance until yesterday the quotation at New York was 10.87½c., with the price at St. Louis, 10.75c., an advance of over ¼c. in the week. One of the principal reasons for this situation is that the outside market has either been bought up or such lots withdrawn, easing the pressure and creating a better tone. While the leading interest as well as some large producers continue to quote 11c., New York, and while outside lots are difficult now to locate, some business has been done at 10.75c., New York, but this is the exception rather than the rule. General demand is at a minimum and the market is dull. Another cause for the general situation mentioned are reports of more or less serious labor troubles in four important localities, effecting lead production and shipments.

**Spelter.**—The market continues inactive and lifeless. There has been more interest displayed and this has resulted in some small buying, but its effect has been of no consequence. Until the expected large foreign buying materializes the stagnant condition will probably continue, accentuated by the waiting attitude which has been so prevalent, caused by the uncertainty as to the Government's needs and purchase of prime Western spelter. The feature of the past week has been the purchase by the Government of 8,250,000 of grade A spelter and 15,000,000 lb. of grade B at 13.50c. and 13c. per pound, St. Louis, respectively. This is an advance of 2c. per lb. over the purchase made in May. No prime Western was included in the order. While the extra price paid for these grades is encouraging it has not affected the grade C market, though the fact is of a bullish nature rather than otherwise. The market is nominal at 8.50c., St. Louis, or 8.75c., New York, for delivery up to October inclusive; though some is reported as sold to January at that price. It is believed that all material available at 8.37½c., St. Louis, has been disposed of.

**Antimony.**—Chinese and Japanese grades are obtainable at 15c. to 15.50c., New York, duty paid, but demand is very light and the market is quiet.

**Aluminum.**—No. 1 virgin metal, 98 to 99 per cent pure, is again lower and is obtainable at 50c. to 52c., New York, for early delivery. It is reported that 100 tons were offered yesterday at 51c., New York.

**Old Metals.**—The market is very unsettled. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible	26.50 to 28.00
Copper, heavy and wire	25.50 to 27.00
Copper, light and bottoms	24.00 to 24.50
Brass, heavy	18.00 to 19.00
Brass, light	13.50 to 13.75
Heavy machine composition	24.00 to 25.00
No. 1 yellow rod brass turnings	17.50
No. 1 red brass or composition turnings	19.00 to 21.00
Lead, heavy	9.25 to 9.375
Lead, tea	7.75
Zinc	6.75

### Chicago

**CHICAGO, July 30.**—The market is relatively quiet, but the bottom was touched in the week and some recovery is shown by every metal, except spelter and antimony. The greater strength is reflected in old metals, and the outlook is considered better by the trade in both new and old. Some attempt has been made to purchase lead, but the offers did not induce holders to sell. Tin is firmly held. Spelter is called "dead." We quote as follows: Casting copper, 27c.; Lake, 30c.; electrolytic, 28.50c.; tin, carloads, 64c.; small lots, 66c. to 67c.; lead, 10.75c.; spelter, 8.50c.; sheet zinc, 19c.; Oriental antimony, 17c. to 18.50c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 22.50c.; copper clips, 22c.; copper bottoms, 21c.; red brass, 21c.; yellow brass, 15c.; lead pipe, 8c.; zinc, 6c.; pewter, No. 1, 35c.; tinfoil, 40c.; block tin, 45c.

### St. Louis

**ST. LOUIS, July 30.**—The week has been rather quiet on the non-ferrous metals market with the close to-day, in car load lots, for lead at 10.75c. and firm and spelter at 8.37½c. In less than car load lots the quotations were: Lead, 11c.; spelter, 9.50c.; tin, 67c.; lake copper, 31c.; electrolytic copper, 30.50c.; Asiatic antimony, 18c. In the Joplin ore district the price of lead, basis of 80 per cent metal, fell off \$5 per ton to \$110 per ton at which price the district output averaged. Zinc blende showed quiet strength at \$65 to \$75 per ton, basis of 60 per cent metal, with the average for the district for the week at \$70 per ton. The production is maintained at a high level despite the fact that the sheet ground operations have decreased, being unprofitable at present prices. Calamine ranged from \$35 to \$42 per ton basis of 40 per cent metal, with the average for the week for the district at \$38 per ton. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10.50c.; heavy yellow brass, 13c.; heavy red brass and light copper, 18c.; heavy copper and copper wire, 21.50c.; pewter, 25c.; tinfoil, 42c.; zinc, 6c.; lead, 7c.; tea lead, 6c.

## IRON AND INDUSTRIAL STOCKS

### Market Generally Inactive, but Good Demand for Short Time Notes

The stock market during the past week was characterized by decided inactivity on the whole, but a quickening in the demand for note securities of high yield was a favorable feature of the situation. Notes of this kind have been sold recently by a number of railroad and industrial corporations, and last week the Canadian Government came into the market for \$100,000,000 of two year 5 per cent notes, which are being sold so as to yield slightly more than 6 per cent. Money is easier again and banks last week were liberal with their offerings of funds. The rate fell to  $2\frac{1}{2}$  per cent and lower for call loans at the stock exchange. Estimates of greatly enlarged expenditures for the war by the Government have caused some feeling of caution, but it is believed that the money market will not be seriously affected by future demands of the Government. The feeling as to price fixing by the Government is one of decreased anxiety, as there is a growing hope that a spirit of fairness will prevail.

Among the industrial stocks that registered gains during the past week were the following: American Car & Foundry,  $\frac{1}{4}$ ; American Locomotive,  $\frac{1}{4}$ ; Baldwin Locomotive,  $\frac{3}{4}$ ; Colorado Fuel & Iron,  $1\frac{1}{8}$ ; International Harvester,  $2\frac{1}{2}$ ; National Enameling & Stamping,  $3\frac{1}{4}$ . Among the stocks that made losses during the week were the following: Allis-Chalmers,  $\frac{1}{4}$ ; American Can, 1; Bethlehem Steel,  $2\frac{3}{4}$ ; Bethlehem Steel, Class B,  $2\frac{1}{3}$  Crucible Steel,  $1\frac{1}{2}$ ; Lackawanna Steel,  $1\frac{1}{4}$ ; Midvale Steel,  $\frac{3}{4}$ ; Pressed Steel Car,  $2\frac{1}{4}$ ; Republic Iron & Steel,  $\frac{3}{4}$ ; United States Steel,  $1\frac{1}{3}$ ; United States Steel, Preferred,  $\frac{1}{4}$ . American Steel Foundries remained the same at the end of the week as at the beginning, being 68 $\frac{3}{4}$ .

The range of prices on active iron and steel stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com., 28 $\frac{1}{2}$ -30	Int. Har. Corp., com., 72
Allis-Chal., pref., 83 $\frac{1}{4}$ -84	Lackawanna Stl., 90 $\frac{1}{2}$ -93 $\frac{1}{2}$
Am. Can., com., 48-49	Lake Sup. Corp., 15 $\frac{1}{2}$ -17 $\frac{1}{2}$
Am. Can., pref., 107 $\frac{1}{2}$	Midvale Steel, 57-59 $\frac{3}{4}$
Am. Car & Fdry., com., 74 $\frac{1}{2}$ -76 $\frac{1}{2}$	Nat.-Acme, 34-34 $\frac{1}{2}$
Am. Car & Fdry., pref., 116	Nat. Enam. & Strm., com., 43 $\frac{1}{2}$ -45 $\frac{1}{2}$
Am. Loco., com., 70 $\frac{1}{2}$ -73 $\frac{1}{4}$	Nat. Enam. & Strm., pref., 99 $\frac{1}{2}$
Am. Loco., pref., 103	N. Y. Air Brake, 131 $\frac{1}{2}$ -132
Am. Rad., com., 283-293	Nova Scotia Stl., 97-98 $\frac{1}{2}$
Am. Rad., pref., 133	Pressed Stl., com., 72 $\frac{1}{2}$ -73 $\frac{1}{2}$
Am. Ship., com., 82 $\frac{1}{2}$ -90 $\frac{1}{4}$	Ry. Steel Spring, com., 51 $\frac{1}{2}$ -52
Am. Ship., pref., 94	Ry. Steel Spring, pref., 98
Am. Steel Fdries., 67 $\frac{1}{2}$ -69	Republic, com., 89-92 $\frac{1}{2}$
Bald. Loco., com., 68 $\frac{1}{2}$ -75 $\frac{1}{2}$	Republic, pref., 102-103 $\frac{1}{2}$
Bald. Loco., pref., 100	Sloss, com., 51 $\frac{1}{2}$ -54 $\frac{1}{2}$
Beth. Steel, com., 126 $\frac{1}{2}$ -132	Sup. Steel, 44 $\frac{1}{2}$ -45 $\frac{1}{2}$
Beth. Steel, Class B, 123 $\frac{1}{2}$ -128 $\frac{3}{4}$	Superior Steel, 1st pref., 102 $\frac{1}{2}$
Case (J. I.), pref., 84	Transue-Williams, 41 $\frac{1}{2}$ -42 $\frac{1}{2}$
Charcoal Iron, com., 8 $\frac{1}{2}$	Un. Alloy Steel, 43-45
Charcoal Iron, pref., 6 $\frac{1}{2}$	U. S. Pipe, com., 21-22 $\frac{1}{2}$
Colo. Fuel, 48-51 $\frac{1}{2}$	U. S. Steel, com., 119 $\frac{1}{2}$ -125 $\frac{1}{4}$
Cruc. Steel, com., 78 $\frac{1}{2}$ -83 $\frac{1}{4}$	U. S. Steel, pref., 117 $\frac{1}{2}$ -119
Cruc. Steel, pref., 102 $\frac{1}{2}$ -103 $\frac{1}{2}$	Va. I. C. & Coke, 68-68 $\frac{1}{2}$
Gen. Electric, 154-155	Westing. Elec., 48-49 $\frac{1}{2}$
Gt. No. Ore Cert., 32 $\frac{1}{2}$ -33 $\frac{1}{2}$	
Gulf S. Steel, 118 $\frac{1}{2}$ -119	
Int. Har. of N. J., com., 113-115 $\frac{1}{2}$	

### Industrial Finances

All the outstanding \$573,000 first mortgage 5 per cent sinking fund gold bonds of the Phillips Sheet & Tin Plate Co., Weirton, W. Va., have been called by the Fidelity Title & Trust Co., Pittsburgh, trustee. The bonds, dated Feb. 1, 1912, will be redeemed on and after Aug. 1, 1917, at the rate of \$1,025 per bond and accrued interest. The bonds were not due until Feb. 1, 1922.

It is said that last week the Westinghouse Electric & Mfg. Co., East Pittsburgh, received \$9,000,000 in cash from the British Government on account of munitions and \$3,000,000 more, balance of the \$12,000,000 due, will be received next week. These payments are those which were referred to by Chairman Tripp in the annual report recently issued when he said, "In addition to current collections item of accounts receivable will be reduced by a cash payment of over \$11,000,000 from the British Government on account of munitions."

The Fulton Pit Car & Mfg. Co., Canal Fulton, Ohio,

has increased its capital stock from \$150,000 to \$400,000. In order to complete a merger of that company with the Kenova Mine Car Co., Kenova, W. Va., no plans have been made as yet to erect new buildings or to purchase additional equipment.

The plant and business of the Keystone Farm Machine Co., North Beaver Street, York, Pa., manufacturer of agricultural implements and machinery, have been acquired at a receiver's sale by Henry C. Niles for a consideration of about \$100,000.

William Holland, Sibley Machine Co., South Bend, has been appointed receiver of the Perkins Windmill Co., one of the oldest manufacturing concerns of Mishawaka, Ind. The liabilities are placed at \$150,000 and assets at \$400,000.

Richard M. Coleman has been appointed receiver for the Meridian Mfg. Co., Indianapolis, maker of automobile bodies. Insufficient working capital is given as cause of the trouble.

Regular and excess subscriptions to the \$2,000,000 preferred stock issue of the Trumbull Steel Co., Warren, Ohio, were more than double the amount of the issue. The \$350,000 common stock offered was also more than oversubscribed. Subscriptions to the common stock must be paid in full Oct. 1, and preferred in four equal installments, the first of which is due Oct. 1. Preferred payments may be anticipated after Aug. 10 by payment of par and accrued dividends to date of payment.

Within a short time an official statement will be made regarding the transfer of the Republic Rubber Co., of Youngstown, Ohio, to the Knight Tire & Rubber Co., of Canton, Ohio, to a new corporation, with a capital of \$20,000,000 which is to take over both companies. It is said officials of the new corporation will be the same as the present officials of the Republic Rubber Co. as follows: T. L. Robinson, chairman of the board of directors; Guy E. Norwood, president; C. F. Garrison, secretary, and Myron I. Arms, II., treasurer.

On Aug. 1 the Republic Rubber Co. paid a quarterly dividend of 2 per cent, which will likely be the last dividend to be paid by the present company, as the merger is expected to be completed before the next dividend period.

### Will Issue Preferred Stock

YOUNGSTOWN, July 31.—Edward F. Clark, president of the Liberty Steel Co., which is to be built at Leavittsburg, two miles west of Warren, Ohio, announces that \$250,000 of preferred stock will be issued at once. This will give the company a total capitalization of \$750,000. The new preferred issue is to be made payable in two installments, Oct. 1 and Jan. 1. It will be offered to holders of common in proportion to their holdings at par. The corporation has \$500,000 in common stock authorized and outstanding.

The foundations for the new sheet mills are now about completed. A new brick office is to be erected in connection with the plant. J. L. Decker of Niles is the architect. The Hunter Construction Co., Youngstown, will erect the mill buildings.

### Dividends

The Canada Foundry & Forgings Co., quarterly, 3 per cent on the common and 1 $\frac{1}{2}$  per cent on the preferred, both payable Aug. 15.

The International Harvester Co. of New Jersey, quarterly, 1 $\frac{1}{2}$  per cent on the preferred, payable Sept. 1.

The International Harvester Corporation, quarterly, 1 $\frac{1}{2}$  per cent on the preferred, payable Sept. 1.

The Pressed Steel Car Co., quarterly, 1 $\frac{1}{4}$  per cent on the common, payable Sept. 5, and 1 $\frac{1}{4}$  per cent on the preferred, payable Aug. 22.

The Scovill Mfg. Co., 15 per cent, payable Aug. 1.

The Standard Mfg. Co., quarterly, 1 $\frac{1}{2}$  per cent, on the preferred, payable Aug. 31.

The Standard Sanitary Mfg. Co., quarterly, 1 $\frac{1}{2}$  per cent on the common and 1 $\frac{1}{4}$  per cent on the preferred, both payable Aug. 10.

The Superior Steel Corporation, 2 per cent on the first and second preferred, payable Aug. 15.

### Bessemer and Basic Averages for July

PITTSBURGH, Aug. 1.—(By Wire).—W. P. Snyder & Co. report that the average price in July on Bessemer iron was \$56.50 and on basic \$52.848 on sales of 1000 tons or more, both in gross tons at Valley furnace. These prices show an advance in Bessemer in July over June of \$3.24 and of basic \$3.698, about one-half the advances in prices shown in June over May.



# Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 76.1c., minimum carload, 40,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 60,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

## Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zees 3 in. and over, 4.50c.

## Wire Products

Wire nails, \$4 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$4.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.95; galvanized wire, \$4.65; galvanized barb wire and fence staples, \$4.85; painted barb wire, \$4.15; polished fence staples, \$4.15; cement-coated nails, \$3.90 base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 43 per cent off list for carload lots, 42 per cent off for 1000-rod lots, and 41 per cent off for small lots, f.o.b. Pittsburgh.

## Nuts and Bolts

Discounts in effect for large buyers are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days.

Carriage bolts, small, rolled thread, 40 per cent, small cut thread, 35 and 2 1/2 per cent; large, 25 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 per cent; large, 30 per cent.

Machine bolts, c. p. c. and t. nuts, small, 30 per cent; large, 20 per cent. Bolt ends, h. p. nuts, 30 per cent; with c. p. nuts, 20 per cent. Lag screws (cone or gimlet point), 45 per cent.

Nuts, h. p. sq. blank, \$2.10 off list, and tapped, \$1.90 off; hex. blank, \$1.90 off, and tapped, \$1.70 off; nuts, c. p. c. and t. sq. blank, \$1.70 off, and tapped, \$1.50 off; hex. blank, \$1.60 off, and tapped, \$1.40 off. Semi-finished hex. nuts, 50 and 10 per cent. Finished and case-hardened nuts, 50 and 10 per cent.

Rivets 7/16 in. in diameter and smaller, 40 per cent.

## Wire Rods

Soft Bessemer and open-hearth rods to domestic consumers at \$95 to \$100; high-carbon rods made from ordinary open-hearth steel, \$100 to \$110, and special steel rods with carbons running from 0.40 to 0.60, \$100 to \$110 at mill; above 0.60 carbon, \$115 to \$120.

## Railroad Spikes and Track Bolts

Railroad spikes 9/16 in. and larger, \$7.00 base; 3/4 in., 7/16 in. and 1/2 in., \$7.00. Boat spikes are occasionally quoted \$7.00 to \$8.00, all per 100 lb. f.o.b. Pittsburgh, but some makers are quoting higher. Track bolts with square nuts, 7c. to 7.50c. to railroads, and 8c. to 8.50c., in small lots, for fairly prompt shipment.

## Steel Rails

Angle bars at 3.50c. to 3.75c. at mill, when sold in connection with orders for standard section rails, and on carload and smaller lots, 4c. to 4.25c. at mill. Light rails: 25 to 45 lb., \$75 to \$80; 16 to 20 lb., \$80 to \$81; 12 and 14 lb., \$82 to \$83; 8 and 10 lb., \$83 to \$84; in carload lots, f.o.b. mill, with usual extras for less than carloads. Standard Bessemer rails, \$38; open-hearth, \$40, per gross ton, Pittsburgh.

## Tin Plate

Effective July 31, prices on all sizes of terne plate were advanced from \$2 to \$2.50 per package. Prices quoted by leading makers are now as follows: 8-lb. coating, 200 lb., \$16 per package; 8-lb. coating, I. C., \$16.30; 12-lb. coating, I. C., \$17.50; 15-lb. coating, I. C., \$18.25; 20-lb. coating, I. C., \$19; 25-lb. coating, I. C., \$20; 30-lb. coating, I. C., \$21; 35-lb. coating, I. C., \$22; 40-lb. coating, I. C., \$23 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

## Iron and Steel Bars

Steel bars at 4.50c. to 5c. for delivery late this year, and 5c. and higher from warehouse, in small lots for prompt shipment. Refined iron bars, 4.75c.; railroad test bars, 5.25c. in carload lots and larger lots f.o.b. mill.

## Wrought Pipe

The following discounts in steel are to jobbers for carloads on the Pittsburgh basing card in effect from May 1, 1917, all full weight, except for LaBelle Iron Works and Wheeling Steel & Iron Co., which quote higher prices, and National Tube, which adheres to card of April 1.

Steel			Butt Weld			Iron		
Inches	Black	Galv.	Inches	Black	Galv.	Inches	Black	Galv.
1/8, 1/4 and 3/8	42	15 1/2	1/8 and 1/4	23	+4	1/8 and 1/4	23	+4
1/2	46	31 1/2	3/8	24	+3	3/8	24	+3
3/4 to 3	49	35 1/2	1/2	28	10	1/2	28	10
			3/4 to 1 1/2	33	17	3/4 to 1 1/2	33	17
Lap Weld			Lap Weld			Lap Weld		
2	42	29 1/2	2	26	12	2	26	12
2 1/2 to 6	45	32 1/2	2 1/2 to 6	28	15	2 1/2 to 6	28	15
7 to 12	42	28 1/2	7 to 12	25	12	7 to 12	25	12
13 and 14	32 1/2	..						
15	30	..						
Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
1/8, 1/4 and 3/8	38	20 1/2	1/8, 1/4 and 3/8	22	5	1/8, 1/4 and 3/8	22	5
1/2	43	30 1/2	1/2	27	14	1/2	27	14
3/4 to 1 1/2	47	34 1/2	3/4 to 1 1/2	33	18	3/4 to 1 1/2	33	18
2 to 3	48	35 1/2						
Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
2	40	28 1/2	2	27	14	2	27	14
2 1/2 to 4	43	31 1/2	2 1/2 to 4	29	17	2 1/2 to 4	29	17
4 to 6	42	30 1/2	4 1/2 to 6	28	16	4 1/2 to 6	28	16
7 to 8	38	24 1/2	7 to 8	20	8	7 to 8	20	8
9 to 12	33	19 1/2	9 to 12	15	3	9 to 12	15	3

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5 1/2 points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

## Boiler Tubes

Nominal discounts on less than carloads, freight added to point of delivery, effective from Nov. 1, 1916, on standard charcoal iron tubes, and from April 2, 1917, on lap-welded steel tubes are as follows:

Lap Welded Steel	Standard Charcoal Iron
1 1/4 and 2 in.....31	1 1/4 in.....23
2 1/4 in.....28	1 1/2 and 2 in.....35
2 1/2 and 2 3/4 in.....34	2 1/4 in.....32
3 and 3 1/4 in.....34	2 1/2 and 2 3/4 in.....38
3 1/2 to 4 1/2 in.....34	3 and 3 1/4 in.....43
5 and 6 in.....33	3 1/2 to 4 1/2 in..No quotations
7 to 13 in.....30	5 and 6 in.....37
	7 to 13 in.....34

Above discounts apply to standard gages and to even gages not more than four gages heavier than standard in standard lengths. Locomotive and steamship special charcoal grades bring higher prices.

1 1/4 in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

## Sheets

Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days.

[Open-hearth stock, \$5 per ton above these prices.]

## Blue Annealed—Bessemer

Nos.	Cents per lb.
Nos. 3 to 8.....	8.00 to 8.50
Nos. 9 and 10.....	8.25 to 8.50
Nos. 11 and 12.....	8.50 to 8.75
Nos. 13 and 14.....	8.75 to 9.00
Nos. 15 and 16.....	9.00 to 9.25

## Box Annealed, One Pass Cold Rolled—Bessemer

Nos.	Cents per lb.
Nos. 17 to 21.....	8.30 to 8.80
Nos. 22 and 24.....	8.35 to 8.85
Nos. 25 and 26.....	8.40 to 8.90
No. 27.....	8.45 to 8.95
No. 28.....	8.50 to 9.00
No. 29.....	8.55 to 9.05
No. 30.....	8.65 to 9.15

## Galvanized Black Sheet Gage—Bessemer

Nos.	Cents per lb.
Nos. 10 and 11.....	9.00 to 9.50
Nos. 12 and 14.....	9.10 to 9.60
Nos. 15 and 16.....	9.25 to 9.75
Nos. 17 to 21.....	9.40 to 9.90
Nos. 22 and 24.....	9.55 to 10.05
Nos. 25 and 26.....	9.70 to 10.20
No. 27.....	9.85 to 10.35
No. 28.....	10.00 to 10.50
No. 29.....	10.25 to 10.75
No. 30.....	10.50 to 11.00

## Tin-Mill Black Plate—Bessemer

Nos.	Cents per lb.
Nos. 15 and 16.....	7.80 to 8.30
Nos. 17 to 21.....	7.85 to 8.35
Nos. 22 to 24.....	7.90 to 8.40
Nos. 25 to 27.....	7.95 to 8.45
No. 28.....	8.00 to 8.50
No. 29.....	8.05 to 8.55
No. 30.....	8.05 to 8.55
Nos. 30 1/2 and 31.....	8.10 to 8.60

# The Shipping Outlook More Encouraging

Remarkable Foreign Trade Showing  
in June—Figures on New Vessels and  
Submarine Losses Unfavorable to Germany

WASHINGTON, July 31.—In the midst of conflicting reports regarding the effectiveness of the German submarine campaign reliable figures have become available here which shed much light on the situation with respect to the ocean-borne trade of the United States and the Allies and which are full of encouragement. The Department of Commerce announced to-day that in spite of the activity of the undersea boats our imports for the month of June broke all records by a large margin, and our exports exceeded those of any month except last January, while both imports and exports for the fiscal year just ended were carried to a high level never dreamed of before the war. Coincidentally with the publication of these statistics comes the information that the U boats, during the past six months, have sunk only a fraction of the tonnage predicted by the German experts when the campaign of frightfulness was launched; that the undersea fleet has suffered heavy losses so that to-day less than 200 U-boats are available for service; that Great Britain and the United States in 1917 will turn out a merchant vessel tonnage in excess of that destroyed in the year, and that during the calendar year 1918 British and American shipyards will probably build no less than 8,000,000 tons of standardized cargo-carrying vessels.

## Record-Breaking Trade Totals in June

The foreign trade of the United States in June exceeded the most sanguine expectations of Government officials. The imports, amounting to \$306,000,000 in round numbers, exceeded those of June, 1916, by \$60,000,000, or nearly 20 per cent, and surpassed those of the next largest month, May, 1917, by \$36,000,000. Our exports for the month aggregated \$575,000,000, a gain as compared with the corresponding month of 1916, of more than \$111,000,000, or nearly 20 per cent. In only one month, January, 1917, have these exports been exceeded. The fiscal year figures dwarf all previous records. Imports aggregated \$2,659,000,000, as compared with \$2,197,000,000 in 1916, the largest previous total. Exports for the fiscal year rose to the huge figure of \$6,294,000,000, as compared with \$4,333,000,000 in 1916, which was an increase of nearly 50 per cent over 1915. It is conclusively shown by these figures that our imports have not been materially interfered with by the submarines, as the official statistics represent goods actually landed in this country, and, while the merchandise reported as exported does not necessarily reach its destination in order to be included in these figures, the cargoes sunk by the submarines are known to have embraced a very small number of American origin.

## Encouraging Shipping Situation

According to the carefully compiled figures of the *London Times*, something less than 2,000,000 tons of British shipping have been destroyed by submarine and mine since Feb. 1. These figures agree closely with tables prepared here by experienced official observers. The number of vessels of other nationalities sunk by U-boats has steadily dwindled of late and according to reliable British data the oversea traffic of Allies and neutrals alike is suffering much less than formerly. An interesting item in this connection is the report that the number of ships of all nationalities entering French ports increased from an average of 842 in the four weeks of March to 1014 for four weeks in June and to 1067 for the same period in July. Departures are in keeping with arrivals. Returns from official Italian sources are equally encouraging.

On July 1, 1916, the British merchant marine included approximately 18,000,000 tons of seaworthy

ships of all kinds. During the past year, it is estimated, about 3,000,000 tons have been lost on account of submarines, mines, accidents and general deterioration. The output of the British shipyards during the same period, however, though not officially announced, is estimated at approximately 2,000,000 tons, and while this shows a net decrease in total tonnage, it must be remembered that the sinkings and other losses represent the destruction of vessels of all types and in various stages of seaworthiness, while the new ships are nearly all standard cargo-carrying vessels of superior speed to those destroyed. Shipbuilding experts are disposed to calculate that in point of efficiency one ton of the new ships is equal to nearly two tons of those destroyed.

## New 1917 Vessels Put at 1,500,000 Tons

While the official figures showing merchant construction in the United States have not been made public since early in the present calendar year, there is reason to believe that the total output of the American yards, including work done for the United States Shipping Board, will amount to nearly 1,500,000 tons by Dec. 31 next. It is therefore apparent that the merchant shipbuilding of England and the United States together has exceeded the losses inflicted by the undersea campaign, this calculation taking no account of the superior efficiency of the new vessels built as compared with those destroyed.

The British shipyards, according to Lloyd George, will turn out during the calendar year 1918 no less than 4,000,000 tons of merchant shipping. During the same period it is estimated that the Emergency Fleet Corporation will secure in American shipyards the construction of not less than 3,000,000 tons, and if Congress provides the additional appropriation of \$500,000,000 requested by the United States Shipping Board, this figure will be substantially increased. In any event it is believed there will be a very substantial output of merchant vessels for private account and the total production in American yards of not less than 4,000,000 tons is confidently expected.

## Heavy Submarine Losses

Very definite reports, though lacking in detail, have recently reached Washington to the effect that the German undersea fleet has encountered heavy losses during the past three months. Following a policy adopted early in the present year, the British Government publishes no data concerning submarines captured or destroyed, but the American Government has received numerous reports, from which it is conservatively deduced that Germany now has less than 200 submarines in serviceable condition. The former German Ambassador, Count Von Bernstorff, in a statement made here last February, predicted that the German Admiralty would have more than 300 U-boats in the waters around the British Isles by April 1 and that these would be sufficient to starve England within a month.

Summarizing the data above presented it would appear that the plans of the German Government have fallen far short of expectations and that there is no danger that England will be starved into submission by the undersea campaign. Officials here, in fact, feel no further anxiety with regard to their ability to transport adequate food supplies to Great Britain. Their chief concern is in obtaining the supplies, while at the same time keeping up the great work of transporting to France a large army with the equipment necessary to enable it to carry on effective operations.

W. L. C.



## Pittsburgh and Nearby Districts

The Jones & Laughlin Steel Co., Pittsburgh, has given a contract to the Thompson-Starrett Co., of New York, for the building of 100 additional houses at Woodlawn, which is the town located near its blast furnaces and steel works at Aliquippa. These houses are to cost about \$350,000 and work is to start at once.

The American Sheet & Tin Plate Co., Pittsburgh, has made plans for the building of a hotel and club house for use of employees in its Sharon, Pa., works, to cost about \$75,000.

The Jones & Laughlin Steel Co., Pittsburgh, recently purchased the property of the D. O. Cunningham Glass Co., on the Southside, near its works, for the price of \$130,000. Part of the ground will be used by the Jones & Laughlin Steel Co., as a site for its new spike plant, which will be removed from its Soho Works in Pittsburgh, to make room for a new large plate mill being installed.

The American Sheet & Tin Plate Co., Pittsburgh, has advanced wages of its hot tin mill employees 14½ per cent, and hot sheet mill hands about 11 per cent. Wages now being paid by this company are slightly more than those paid by the union sheet and tin plate mills, working under the wage scale of the Amalgamated Association of Iron, Steel and Tin Workers. This company will erect a new hotel and build 100 homes for use of employees at its Farrell, Pa., works.

The Petroleum Iron Works Co., Sharon, Pa., has just completed a steel stack at the works of the Youngstown Sheet & Tube Co., which is 160 ft. high. This makes a total of 76 steel stacks fabricated by this company for the Youngstown Sheet & Tube Co.

The National Tube Co., Pittsburgh, paid taxes last week for its blast furnaces, steel plants and tube mills in McKeesport, Pa., amounting to \$57,999.14. The above amount was for McKeesport city taxes, and the school taxes of the company in McKeesport, payable shortly, will be a larger amount. The National Tube Co. is by far the largest single taxpayer in McKeesport.

The H. Koppers Co., Union Arcade Bldg., Pittsburgh, is building for the Dominion Steel Corporation, Sydney, Nova Scotia, two batteries of 60 Koppers by-product ovens each. The first battery is expected to be in operation about March 15, 1918, and the second battery about Aug. 15, 1918. These ovens will have an estimated annual output of 1,800,000 tons of coke. The Indiana Steel Co. is also building 120 Koppers by-product coke ovens at Gary, doing the work itself. On Monday, July 30, coal was fired in the 110 by-product coke ovens built by the Seaboard By-Products Co., a subsidiary interest of the H. Koppers Co., at Hackensack Meadows, near Jersey City, N. J. These ovens have been under way for about a year, and the output of blast furnace coke will be sold partly to the Wharton Steel Co. and the remainder to other Eastern blast furnaces. The foundry coke will be sold to Eastern foundries, while the water gas coke will be sold to the Consolidated Gas Co., to be used in making water gas for illuminating purposes. Formerly this company used anthracite coal in making water gas, but it will be replaced as a fuel by by-product coke. The illuminating gas made at the Seaboard By-Product Co.'s plant will be sold to the Public Service Corporation of New Jersey, which furnishes illuminating gas to Newark and other nearby cities; in fact, this plant was built primarily for this purpose.

The Pittsburgh Steel Products Co., Frick Bldg., Pittsburgh, has adopted the plan of having its office employees report for duty at 8 a. m. and stop at 4 p. m., with one hour for luncheon. The company believes that by having its office employees report one-half hour earlier in the morning and stop at 4 p. m., it will get better results, while they will have more time for recreation. This plan will continue in force until Sept. 15 next.

The Keystone Wire Goods Co., Greensburg, Pa., has been organized with a capital of \$40,000 to manufacture articles made from wire, such as garment hangers, etc.

A purchase of 85,000 acres of iron ore land in Wayne County, Missouri, was completed in St. Louis July 28 by the transfer of the land from the Concrete Investment Co. to the Midvale Steel & Ordnance Co.

## Awards Contract for Plant

MILWAUKEE, WIS., July 31.—The Wisconsin Gun Co., Milwaukee, incorporated recently with a capital stock of \$100,000 by five of the leading metal working industries of the city to manufacture 3-in. field ordnance for the Government, has awarded contracts for the construction of a complete plant, to be located on Orchard Street, between Thirty-fifth and Thirty-seventh Avenues, in West Milwaukee. It is designed by Herman J. Esser, architect, Camp Building, Milwaukee, and will be 130 x 300 ft., with sawtooth roof, creosoted block floors, and fireproof construction throughout. The general contract is in charge of the Worden-Allen Co., Milwaukee. Henry J. Wiegand, superintendent, Cutler-Hammer Mfg. Co., is in general charge of the erection, equipment and management of the plant, having been given leave of absence for this purpose. The company will employ between 350 and 400 highly skilled workmen and will manufacture 1000 of the 1916 model 3-in. gun at the rate of three each working day. As soon as practicable, the Government will take over the entire plant, the capital to build which was furnished by the Kearney & Trecker Co., milling machines; Cutler-Hammer Mfg. Co., electric controlling devices; Bucyrus Co., South Milwaukee, steam shovels; Northwestern Malleable Iron Co., founder, and Power & Mining Machinery Co., Cudahy, Wis., machinery and pumps. Frederick L. Sivy, Northwestern Malleable Iron Co., is secretary. The project was noted in the July 19 issue of THE IRON AGE, p. 137.

## Large Locomotive Orders

Orders for locomotives in the past two weeks call for 319. The United States Government has ordered 300 consolidation locomotives, 80 tons each, equally divided between the American Locomotive Co. and the Baldwin Locomotive Works. It is understood that these locomotives are for the service of the American forces in France and will receive prior consideration to all orders in their execution. The Norfolk & Western is building 10 Mallet locomotives in its own shops and the Toronto, Hamilton & Buffalo Railway has ordered six switching locomotives from the Canadian Locomotive Co. The Chicago & Alton is in the market for five additional Mikado locomotives and the Chicago, Milwaukee & St. Paul and the Boston & Maine are also about to make purchases.

## Jones & Laughlin Plate Mill Starts

Last week the Jones & Laughlin Steel Co. started up the 128-in. 3-high plate mill, which the company bought late last year from the Dominion Iron & Steel Co., Ltd., Sydney, N. S. This mill will roll sheared plates up to 120 in. wide, and will have a capacity of 15,000 to 18,000 tons of plates per month. During last year, and early this year, the Jones & Laughlin Steel Co. installed and now has in operation six new 50-ton open-hearth furnaces, which will furnish the steel for this plate mill. The company is furnishing large quantities of plates right along for Government use, and with the starting of this new plate mill the quantity of plates it is furnishing to the Government will likely be largely increased.

## New Company to Sell Electric Furnaces

The Seneca Electric Furnace Corporation of Albany, N. Y., has been incorporated for the purpose of manufacturing and selling electric furnaces for steel making and other purposes. Thornton W. Price is vice-president and general manager and Edwin Corning is treasurer. The New York office of the company is located in the Woolworth Building.

The Auto Car Co., Pittsburgh, is building a large machine shop at Ardmore, Pa., where its plant is located, and considerable equipment will be needed, part of which has been purchased. The American Bridge Co. will erect a steel building for this shop, which will take about 400 tons of fabricated steel.

## PERSONAL



Newman Ebersole of the purchasing department of the American Rolling Mill Co., Middletown, Ohio, will head a party of "Armco" employees, numbering 14, who have formed an ambulance unit for service in France. The unit will be maintained by contributions from the organization of the company.

John T. Wilkin has been elected president of the Connersville Blower Co., Connersville, Ind., in addition to his duties as engineer. Mr. Wilkin was one of the organizers of the company in 1892. The president, C. W. Ansted, died some time ago.

George Looms, who has been assistant purchasing agent for B. F. Avery & Sons, Louisville, Ky., has become purchasing agent for the Cyclops Steel Co., Titusville, Pa.

Edward J. Kearney, secretary-treasurer Kearney & Trecker Co., Milwaukee, maker of milling machines, has been appointed member of the Wisconsin State Board of Vocational Education, created by the last legislature. He is one of three representatives of the employers of Wisconsin.

J. B. McComber, Green Bay, Wis., has withdrawn from the Fox River Cornice & Corrugating Co., Green Bay, of which he was secretary-treasurer since February, 1910.

Donald Fraser, second vice-president and superintendent, Chain Belt Co., Milwaukee, has received word that his son, Donald K. Fraser, formerly assistant superintendent, who enlisted in the Nineteenth Canadian regiment, was wounded in the battle of Vimy Ridge and is recuperating in a London hospital.

Arthur C. Pletz, general manager Morris Machine Tool Co., Cincinnati, has returned from a three weeks' vacation spent in Canada and at Eastern summer resorts.

William C. Aldrich, formerly superintendent of the Penn Steel & Iron Co., Lancaster, has been made assistant to the general manager. J. O. B. Dellet has been made secretary to succeed J. Hale Steinman, now in the Federal service, and W. F. Barry has been made superintendent. Mr. Aldrich is a native of Harrisburg, Pa., and went to Lancaster from the Portland Rolling Mill Co., Portland, Me.

O. B. Newton has been appointed general sales agent of the Virginia Iron, Coal & Coke Co., Roanoke, Va., effective Aug. 1, vice C. W. Owen, resigned, to engage in other business.

The Pangborn Corporation, Hagerstown, Md., has extended its sales organization by the addition of Alfred L. Holmes and C. M. Goldman, who will act in the capacity of district sales agents. Mr. Holmes' headquarters will be at Cleveland and Mr. Goldman's at Philadelphia. Mr. Holmes was formerly with the Pangborn Corporation, in the same capacity for about six years, and Mr. Goldman has been representing the Obermayer Co. in the Philadelphia territory for some years.

J. H. Jowett, general sales manager of the Ingersoll-Rand Co., New York, has been elected by the board of directors vice-president of the company, and L. D. Albin, formerly assistant general sales manager, has been appointed general sales manager. Mr. Jowett and Mr. Albin will continue to make the offices at 11 Broadway their headquarters.

B. F. Brompton has been appointed comptroller of the Canadian Car & Foundry Co., Montreal. He was associated with Price, Waterhouse & Co., in New York, for over 10 years, and subsequently held the position of general auditor to the Dominion Steel Corporation, Sydney, N. S., for several years.

James E. Wilson, traffic manager of the Youngstown Chamber of Commerce, has resigned to become

traffic manager of the Larkin Co., Buffalo. He will be succeeded by Harry Rhodehouse of Pittsburgh, at present traveling freight agent for the New York Central Railroad.

The Connellsville coke region has been given further representation on the Coke Committee of the Committee on Coal Production of the Council of National Defense. Roy A. Rainey has been appointed chairman, Vice-President E. L. Pierce of the Smet-Solvay Co., Syracuse, N. Y., resigned, and Scott Stewart, general manager of the W. J. Rainey interests, has been appointed a member and secretary of the committee. Mr. Rainey has also been made a member of the Committee on Coal Production.

C. F. Williams, who has been the Pittsburgh representative of the *Iron Trade Review* for five years, has resigned, to become identified with the Allen S. Davison Co., Oliver Building, Pittsburgh, which owns and operates Bessie furnace at New Straightsville, Ohio, making ferrosilicon, and also Sharpsville furnace at Sharpsville, Pa., operating on Bessemer iron. The company controls the Basic Products Co., manufacturer of dead burned dolomite syndolag. Mr. Williams will have the best wishes of his many friends in his new business. He will be succeeded by L. W. Moffett, Washington, D. C., correspondent for four years of the *Iron Trade Review*.

Louis G. Henes, Pacific Coast representative for Manning, Maxwell & Moore for the past eight years, has resigned to act as direct factory representative of Steinle Turret Machine Co.; Foster Machine Co.; Newton Machine Tool Works; New Britain Machine Co.; Houston, Stanwood & Gamble Co. His office is at Room 1037, Monadnock Building, San Francisco.

T. J. Ray, assistant manager of the Cleveland plant of the Peck, Stow & Wilcox Co., Southington, Conn., has been elected a director of the company succeeding W. R. Walkley, who has resigned because of poor health.

A. B. Marble, district sales manager of the Boston office of the Jones & Laughlin Steel Co., Pittsburgh, has been transferred temporarily to the general offices of the company in the Jones & Laughlin Building, Pittsburgh. Mr. Marble is filling the duties of J. L. Haines as assistant to Vice-President Willis L. King, Mr. Haines having been absent in Massachusetts for several months, recuperating his health, which is steadily improving.

F. K. Bennett, rolling mill superintendent of the Tata Iron & Steel Co., Sakchi, India, is in this country on a leave of absence, after three years' service at the Tata works.

M. A. Neeland, who went to Russia early this year to make investigations in iron and steel lines for the American International Corporation, returned to New York last week.

J. V. McCartney, formerly of the office of Perin & Marshall, New York, is en route to India with a party of open-hearth furnace men who have engaged with the Tata Iron & Steel Co., Sakchi, Bengal, India. Mr. McCartney and L. V. Workman, also of the office of Perin & Marshall, will be engaged on mechanical work at Sakchi.

Stanley W. Hull, 3729 Prospect Avenue, Cleveland, has organized a new mechanical drafting service company for inventors and manufacturers known as S. W. Hull & Co. For the past ten years he has had experience in the engineering departments of plants of the General Electric Co., Westinghouse Church Kerr & Co. and Brown Hoisting Machinery Co., particularly in connection with limit systems for the production of interchangeable parts. He will specialize also in the design of mechanical and electrical devices.

W. T. Collins, who has been with the Scullin Steel Co., St. Louis, for some years, has been appointed vice-consul at Tien-Tsin, China. He is a native of Kentucky, having been born at Covington, but has lived in St. Louis since 1889. He leaves for his new post Aug. 6.

H. L. Shepler, who recently resigned his position as vice-president, in charge of production, of the Willys-Overland Co., Toledo, Ohio, will become associated with the Aircraft Production Board in Washington. It is understood that Mr. Shepler's new position will give him full supervision of the construction of airplanes for the United States Government.



## SOME PERPLEXING QUESTIONS

### Important Points Connected with Claims for Exemption

WASHINGTON, July 31.—No little anxiety has been aroused among manufacturers of munitions and others having Government contracts lest the rigid enforcement of President Wilson's executive order, issued July 28, warning all Government officials and private employers to exercise the "greatest care" in issuing exemption affidavits to employees, may result in denying exemption to a large number of mechanics and others in private establishments, whose retention in their present jobs has heretofore been confidently counted upon. Many inquiries are being received here as to the exact scope of the President's order and the construction to be put upon certain passages therein.

While the President's order is mandatory upon none but Government employees, it lays down a general rule for private establishments as well, emphasizing the high national importance of carrying out "the spirit of the selective act and of securing its fullest effectiveness by holding to military service all drafted men who are not absolutely indispensable," and it has been followed up by an announcement by Provost Marshal General Crowder that the employees of no special class of industrial concerns will be allowed exemptions because of the character of their employment. In his proclamation the President urges that exemptions should be reduced to "the minimum number consistent with the maintenance of vital national interests during the emergency of war," and that while the order is addressed to Federal department officials "it is earnestly hoped that all citizens who may be called upon as employers, under section 44 of the regulations, to make affidavits for securing the discharge of persons deemed to be indispensable to national industrial interests during the emergency, will exercise the same conscientiousness and scrupulous caution, to the end that there will appear to be no favored or exempted class among the citizens called by law to the national defense."

Soon after the issuance of the President's proclamation the Coal Production Committee of the Council of National Defense inquired of General Crowder as to whether, in view of the importance of their employment, coal miners would be relieved from military service. The reply of the Provost Marshal General has been incorporated in a bulletin given out by the Committee on Public Information in part as follows:

The Coal Production Committee of the Council of National Defense was definitely informed yesterday by Provost Marshal General Crowder that miners as a class will not be exempted from the selective draft. No class exemptions will be made, as is definitely set forth under Section 44 of the Exemption Regulations, which states that any claims for discharge on the part of persons engaged in industries, including agriculture, must be filed with the district board on a form provided by the Provost Marshal General and supplied by district and local boards for that purpose.

General Crowder's office has been deluged with mail, hundreds of letters coming from the heads of large industrial concerns and pleading for special exemptions in the case of men doing specialized work. Appeals of this kind can accomplish nothing, as the Provost Marshal General cannot show any favoritism. The question of whether or not a man is more useful to his country in a peaceful pursuit than in military service is a matter to be taken up with the district board and for that board to determine in the light of the circumstances surrounding each individual case.

The apparent intention of the President and the officials of the Provost Marshal General's office to draw the line as tightly as possible has raised the question as to the proper definition of the term "absolutely indispensable" as applied to munitions workers and other skilled laborers. Persons making inquiries here on this score are referred to the so-called presidential regulations governing exemptions among employees of Government manufacturing establishments. The most pertinent of these regulations is as follows:

(d) Artificers and workmen employed in the armories, arsenals and navy yards of the United States. Any artificer or workman employed in any armory, arsenal, or navy yard

of the United States, upon presentation to such local board, at any time within 10 days after the filing of a claim of discharge by or in respect of such person, of an affidavit signed by the commandant or officer having command of the armory, arsenal, or navy yard of the United States in which such person is employed, stating that such person is, in his opinion, necessary to the efficient and adequate operation of such armory, arsenal, or navy yard of the United States and cannot be replaced by another person without substantial material loss of efficiency in the effective and adequate operation of such armory, arsenal or navy yard of the United States.

It has heretofore been assumed that all employees of private munitions plants would be exempted on the ground that their service is absolutely essential to the successful prosecution of the war. It is pointed out, however, by managers of private establishments who have looked into the matter that the provision (d) above quoted would permit the drafting of any thoroughly skilled mechanic working in a munitions plant, provided another mechanic of reasonable skill could be supplied in his place so that the operations of the plant might proceed "without substantial material loss of efficiency." This would mean, it is contended, that large numbers of men might be drafted from munitions plants so long as their places could be filled by men fairly skilled in the same trade. The fact that new men could not, under any circumstances, maintain the plant at exactly the same standard of efficiency cannot be taken into account if the regulations are to be literally construed, for it goes without saying that some decrease in efficiency, however slight, must follow the replacing of a skilled mechanic by another who has not recently worked at exactly the same job and under the same conditions.

### Seaman-Sleeth Co. Sale Completed

At Pittsburgh, on Monday, July 30, final details were closed and the purchase price of \$2,000,000 was paid over, by which the plant and assets of the Seaman-Sleeth Co., owner of the Phoenix Roll Works in that city, have been transferred to the Pittsburgh Rolls Corporation. A detailed account of the proposed transfer of this property to the new owners was printed on page 218 of THE IRON AGE of July 26. The Pittsburgh Rolls Corporation has a capital stock of \$2,000,000, of which \$1,500,000 is 7 per cent cumulative preferred stock and \$1,500,000 common stock. There are also \$1,000,000—20 year 6 per cent first mortgage bonds. For over 60 years, this plant has been engaged in the manufacture of rolls, the plant being equipped with four 30-ton, one 18-ton and one 10-ton air furnaces, one 60-in. and two 48-in. cupolas. Recently adjoining property was acquired for the erection of a 25-ton open hearth furnace, which is now in course of construction. The principal products are sand rolls and Phoenix steel rolls, which the Seaman-Sleeth Co. has for many years been furnishing to many of the steel companies in the United States, Mexico, Canada and Japan. It is understood the new owners have contracts to re-equip a number of English steel plants. The new open hearth furnace will double the plant's capacity. Other improvements just made or under course of construction include an industrial railway with electric locomotives, the installation of an electric plant to drive the machinery by electricity instead of steam, and an emergency gas engine.

At an organization meeting held after the deal was closed, Jos. S. Seaman, who has been the active head of the Seaman-Sleeth Co. for more than 50 years, was elected chairman of the board of directors; David L. Eynon, formerly general manager, was elected president; Henry Meckley, secretary, and Harry R. Warfield, vice-president and treasurer. The management of the former Seaman-Sleeth Co. will remain identically the same with the Pittsburgh Rolls Corporation, and the same service and high-class products furnished to the trade for so many years will continue. The only change made is the entrance of Harry R. Warfield as an active official of the company.

# Machinery Markets and News of the Works

## CONTROL BY GOVERNMENT

### Several Plants Under U. S. Supervision

#### Big War Orders May Require Virtual Commandeering of Machinery and Machine-Tool Works—Business Very Active

Just how far the Government will go in taking over the output of machinery and machine-tool plants is problematical, but the fact that several large plants are at present virtually under federal control leads many to believe that Government necessities may make further action along this line necessary.

The air is filled with reports of big projects having to do with war preparations, in all of which the machinery trade must be reckoned upon to furnish large quantities of equipment. Among these is a proposed plant which the Government has asked the Bullard Machine Tool Co., Bridgeport, Conn., to build at an estimated cost of from \$5,000,000 to \$10,000,000 for making heavy artillery. Congress is being asked for upwards of \$2,000,000,000 for the manufacture of big guns, and the plan of Secretary Daniels for a \$7,500,000 plant at Washington will tax the builders of machine tools. New war contracts include one taken by the Ingersoll-Rand Co. for shells and guns.

Our Government is asking for bids and will close soon for about \$2,000,000 worth of machine tools for the railways of France, and the Pennsylvania Railroad Co., acting in behalf of the United States Government, is asking for bids on seven vertical boring and turning mills, two vertical turret lathes, one horizontal boring and drilling machine and a car wheel boring mill, which are required for the use of a regiment of railway men enlisted as U. S. Army Engineers, who are going to France to assist in the rehabilitation of the railways of that country and to build a new railroad for the American army.

The shipbuilding program is about in the same position as a week ago, but it is expected that contracts for ships will be awarded soon by the Emergency Fleet Corporation, and then a great deal of business will be offered to machinery and machine-tool concerns. The Federal Shipbuilding Co., which is a subsidiary of the United States Steel Corporation, is in the market for a large quantity of equipment for its shipbuilding plant on the Newark meadows. The Kelly-Atkinson Construction Co. of Chicago has taken a Government contract for 20 steel cargo steamers and will construct a shipbuilding plant somewhere on the Atlantic seaboard. The Downey Shipbuilding Corporation is making inquiries for equipment for its yard on Staten Island. It is understood that this concern has plans for several shop buildings and will require considerable new equipment.

Export business from New York continues active. The Tata Iron & Steel Co., Ltd., Sakchi, India, has made purchases during the past week running into very high figures. Large orders for Russia and Italy have recently been placed.

In the New England territory there have been sizable orders for tools, particularly grinding machines, from concerns which are engaging in the manufacture of airplane engines and motor trucks, among these being the Packard Motor Car Co., the Nash Motors Co. and the Leland interests. The Delaware, Lackawanna & Western Railroad has sent out a list of tools required. The General Electric Co. has been doing considerable buying.

Chicago reports activity on war work. The new Wisconsin Gun Co., Milwaukee, which will make three-inch field pieces, has placed large orders for tools. The Nash Motors Co., Kenosha, which has a Government contract for motor truck chassis, has been buying tools and the Harley-Davidson Motorcycle Co., Milwaukee, which has a Government motorcycle contract, is expected to come into the market. The British Government will give orders in the Chicago territory for tractors of the caterpillar type. One order, it is said, will approximate \$1,250,000.

In Cleveland there has been a heavy but widely scattered demand for machinery and tools, mostly for Government work. The Platt Iron Works, Dayton, Ohio, wants 20 lathes of from 30 to 36 in. Boring mills and planers are in great demand for Government work. The Baltimore & Ohio Railroad has bought two 26-in. turret lathes for the Newark, Ohio, car shops. The American Brake Shoe & Foundry Co., Erie, Pa., is placing orders on its list recently sent out.

The ordering of munitions for the Government is under way in Detroit and vicinity and there is considerable activity on airplanes. One body factory is ordering material to build 150 airplanes, exclusive of motors, a day. Large motor truck orders placed in Detroit and nearby have brought out a demand for tools.

## New York

NEW YORK, July 31.

The Government is taking a stronger hand in the machine-tool situation. All of the plants of the Niles-Bement-Pond Co. are virtually under Government control, and it is said that other large plants may be commandeered soon in order to provide the necessary tools for urgent war work.

Big Government work is absorbing the attention of the trade. Such projects as the manufacture of heavy artillery guns, for which an appropriation exceeding \$2,000,000,000 is now being asked, and the similar work which is being provided for at the navy yards and arsenals, including the \$7,500,000 plant at Washington, will tax the facilities of all of the largest machine-tool plants. Last week the Government placed orders for \$1,500,000 worth of big tools for navy yards and arsenals. The Bullard Machine Tool Co., Bridgeport, Conn., has been asked by the War Department to build a plant at Bridgeport, costing from \$5,000,000 to \$10,000,000, for making big guns, and if this plan goes through, it is understood that the Bullard company will make many of the tools for equipping the plant.

The Ingersoll-Rand Co. has taken a Government contract for shells and guns, and is said to be anxious to locate a concern able to make 8-ft. guns with 4-in. bore to take a sub-contract. The American Car & Foundry Co., which has recently been adding to its equipment, will make 740,000 shells in its Berwick (Pa.) plant and 10,000 10-in. projectiles in its Detroit plant. The Consolidated Car Heating Co. has completed equipment of a new plant at Albany and is starting work on a large shell contract. The plant of the Worthington Pump & Machinery Corporation at Hazleton, Pa., is



said to be nearly ready for similar work. The Maxim Munitions Corporation is working on a contract for 260,000,000 cartridges at its plants at Watertown, N. Y., and Derby, Conn.

As a part of the program for the rehabilitation of France's railways under the supervision of a regiment of railway men organized as U. S. Army Engineers, this Government is receiving bids and will soon buy about \$2,000,000 worth of machine tools and machinery needed for railroad repair shops in France. The Pennsylvania Railroad Co., acting in behalf of the U. S. Government, has sent out a list asking for bids by Aug. 2 on tools urgently needed, and which, it is understood, will be shipped on the transports which carry the railroad men to France. This list is as follows:

- 1 vertical boring and turning mill, 100 in. in diameter.
- 1 vertical boring and turning mill, 84 in. in diameter.
- 1 vertical boring and turning mill, 52 in. in diameter.
- 4 vertical boring and turning mills, 42 in. in diameter.
- 2 vertical turret lathes, 34 in. in diameter.
- 1 horizontal boring and drilling machine, 24 x 6 ft., No. 1 or 50 in.
- 1 car wheel boring mill.

These tools are subject to the commandeering process, if necessary, and must be scheduled for prompt delivery, as a patriotic duty. Prices are asked f.o.b. New York, Philadelphia and Newport News.

Intimations from Washington are that the shipbuilding program will not be materially changed, but that it will be enlarged wherever possible, as both wooden and steel ships will be constructed in as large numbers as the facilities of the country will permit. Two concerns, the Lake Torpedo Boat Co., Bridgeport, Conn., and the American U-Boats Co., 21 Park Row, New York, are said to be ready to undertake the building of submarine cargo boats, if the Emergency Fleet Corporation gives the word. Concrete ships have also been talked of, but there is nothing official to indicate that they will actually be built. The United States Steel Corporation is asking for bids on cranes, hoists and machinery needed for its Federal Shipbuilding Co. plant near Newark. Twenty-eight hoists will be bought for the plate and angle shop and considerable other equipment will be needed for this and other shops. The Sun Shipbuilding Co., Chester, Pa., the Chester Shipbuilding Co., Chester and Bristol, Pa., and the Pennsylvania Shipbuilding Co. (including the New Jersey Shipbuilding Co. and Pusey & Jones) are all buying equipment of various kinds. All of these companies have recently placed orders for electric hoists. One concern has about 100 hoists on order for shipbuilding plants. The Newburgh Shipyards, Inc., which is equipping a new plant for steel and wooden ships at Newburgh, N. Y., has bought second-hand cranes in order to get quick deliveries, and is in the market for punching and shearing machinery and other shop equipment. The Downey Shipbuilding Corporation, 120 Broadway, is making inquiries for miscellaneous tools.

The Kelly-Atkinson Construction Co., Chicago, will construct a shipyard on the Atlantic seaboard, having taken a contract for 20 steel cargo steamers for the Emergency Fleet Corporation.

There are expectations that contracts for ships will be placed in Washington this week. Some of the concerns which are said to be looking for contracts are as follows: American International Corporation, Submarine Boat Corporation and Lackawanna Bridge Co., Whittlesey & Whittlesey, Sun Shipbuilding Co., Chester Shipbuilding Co., the Pennsylvania Shipbuilding Co., the New Jersey Shipbuilding Co., the Groton Iron Works, the Newburgh Shipyards, Inc., the George A. Fuller Co., H. C. Raynes & Co., James Stewart & Co. Inc., Standard Shipbuilding Corporation, the Staten Island Shipbuilding Co., the Fort Mifflin Shipbuilding Co., the Delta Shipbuilding Co., and the Merchants' Shipbuilding Corporation. This is only a partial list of those which have submitted propositions to the Emergency Fleet Corporation. Some are possibly doomed to disappointment because of the difficulties they will have in convincing the Government of their ability to equip plants.

The Newport News Shipbuilding & Dry Dock Co. still has some crane orders to be placed, in addition to several recently awarded to the Shaw Electric Crane Co. and Heyl & Patterson, Inc., the latter taking an order for eight 15-ton and two 75-ton overhead electric cranes. Several of the large crane-building plants are sold up until next March, April or May and are not disposed to take on any more business unless it is virtually forced upon them because of Government necessities. Some concerns have put up their prices so high that general business is being discouraged. Shipyards are active buyers, but new inquiries are fewer. The New Jersey Foundry & Machine Co. has taken an order for 15 2-ton cranes wanted by the contractors who are erecting mine-storage buildings for the Government. The T. H. Symington Co., Rochester, N. Y., has bought 11 7½-ton cranes from the Chesapeake Iron Works, Baltimore. The Bullard Machine Tool Co. has bought a 5-ton crane. The Chile Ex-

ploration Co. and affiliated companies have not concluded their extensive purchases of cranes. There is an unusually heavy demand for steam hammers and builders are sold up for many months ahead.

Prices of machinery and machine tools continue to advance. Makers of punching and shearing machinery, who recently withdrew all prices, will advance 10 to 15 per cent. No single line of machinery or machine tools can, however, be singled out as being higher in prices, as the advances are general, and further rises are looked for Aug. 1. The labor situation is disturbing to some builders. Manufacturers who have Government contracts on a "cost plus" basis are offering such high prices for labor that it is difficult for concerns doing work on a contract-price basis to compete with them in the labor market.

Although the necessity for export licenses has greatly disturbed general export business, the sales of machinery and machine tools for abroad continue on a large scale. The Tata Iron & Steel Co., Ltd., Sakchi, India, which is erecting a \$20,000,000 plant, has made purchases of equipment in the past week running into very large figures. On the other hand machinery concerns have declined to quote on some business for export because of the certainty that it will be needed at home. A shipbuilding concern in England wanted a complete equipment for shipment one year from now, but several builders to whom the inquiry was referred said they could not tell what a year might bring forth, and preferred to sell their output for our own Government work. Large orders for Russia and Italy have recently been placed.

The Morse Dry Dock & Repair Co., 17 Battery Place, New York, will build a two-story, reinforced-concrete and brick machine shop, about 100 x 200 ft., at First Avenue and Fifty-sixth Street, Brooklyn. Contract for the erection has been awarded.

The Loening Aeronautical Engineering Corporation, New York, has been incorporated with a capital of \$25,000 to manufacture aircraft. G. C. and R. R. Loening and T. C. Curtis, 44 Wall Street, are the incorporators.

J. R. Wood & Sons, 1325 Atlantic Avenue, Brooklyn, N. Y., manufacturing jewelers, will build a new five-story plant, about 80 x 134 ft., on Atlantic Avenue, to cost \$75,000.

The American Machine & Foundry Co., Fifty-sixth Street and Second Avenue, Brooklyn, N. Y., will make alterations and improvements in its plant to cost about \$20,000.

The Shipbuilders Iron Works, Inc., Brooklyn, N. Y., has been incorporated with a capital of \$10,000 to manufacture iron and steel fittings for ships and boats. C. J. N. Poyer, A. A. Sawman and W. A. Hall, 648 East Tenth Street, are the incorporators.

The Jacob Brothers Co., 539 West Thirty-ninth Street, New York, will build a three-story brick extension, 23 x 50 ft., to its piano factory at Walton Avenue and 138th Street.

Joseph A. Atwell, Inc., New York, has been organized with a capital of \$50,000 to manufacture engines and kindred products. C. A. Slocum, W. W. Westall and M. F. Tilman, 62 Wall Street, are the incorporators.

The Progressive Smelting & Metal Corporation, 543 West Twenty-fifth Street, New York, will make extensions to its two-story brick foundry to cost about \$5,000.

The Hydrocraft Co., New York, has been incorporated with a capital of \$30,000 to manufacture hydroplanes and other aircraft. L. W. E. Coleman, C. L. Andrews and H. P. Keane, 378 Central Park West, are the incorporators.

Abraham, J. R., and Wallace MacDougall, and Edward L. Hearn, New York, have incorporated in Delaware the American File Restoration Co., with capital of \$100,000 to operate a file works.

The Astoria Casket Co., 16 Chestnut Street, Long Island City, N. Y., has had plans prepared for alterations and improvements in its plant on Fourth Avenue to cost about \$10,000.

Ward E. Pearson, Edward F. Oats and Edwin L. Russell, New York, have incorporated in Delaware the Silent Valve Motor Corporation, with capital of \$3,500,000 to manufacture motors, engines and allied products.

The Nation Wire Wheel Co., Geneva, N. Y., has awarded a contract for the construction of a two-story plant, 110 x 110 ft., for the manufacture of wire wheels for automobiles. H. P. Sickles, Rochester, N. Y., is the contractor.

The Catchpole Boiler, Foundry & Machine Co., 23 Jackson Street, Geneva, N. Y., will build an extension to its plant.

The St. Lawrence Metal Products Corporation, Ogdensburg, N. Y., has been incorporated with a capital of \$200,000 to manufacture metal specialties. E. J. Turley, P. H. Fitzgibbons and J. E. Fell, Ogdensburg, are the incorporators.

The Oswego Machine Works, West First and Schuyler streets, Oswego, N. Y., manufacturer of cutting machines, will build a one-story addition, about 60 x 100 ft. The Austin Co., Cleveland, has the contract.

The Morris Machine Works, 31 Genesee Street, Baldwinsville, N. Y., manufacturer of pumping machinery, is building an extension, 50 x 60 ft., to the erection shops.

The Huguenot Motor & Supply Co., New Rochelle, N. Y., has been incorporated with a nominal capital of \$5,500 to manufacture motors, engines, etc. A. B. Gilkes, J. F. Phillips and P. Jenness, New Rochelle, are the incorporators.

The Sealright Co., Fulton, N. Y., has been incorporated with a capital of \$30,000 to manufacture machinery and tools. E. W. Skinner, W. L. Wright and J. T. Bond, Fulton, are the incorporators.

The Onondaga Steel Co., East Water Street, Syracuse, N. Y., will build three new factory buildings in the Park Hill section, East Syracuse.

The Security Tire & Rubber Co. of Central New York, Syracuse, N. Y., has been incorporated with a capital of \$100,000 to manufacture automobile tires and tubes. Frederick D. Burchill, Jordan, N. Y.; George J. Quay, Cleveland, and Joseph A. Gloger, Syracuse, are the incorporators.

The Atlas Steel Casting Co., 1963 Elmwood Avenue, Buffalo, will build a one-story extension to its pattern shop, to provide about 3300 sq. ft. additional floor space.

Edward Gaskins, Frank P. Ranahan and Jacob Cobersheimer, Buffalo, have incorporated in Delaware the Lake Shipbuilding & Construction Co. of Buffalo, with capital of \$25,000, to operate a local shipbuilding plant.

The Board of Education, 1401 New York Telephone Building, Buffalo, will receive bids until 12 noon, Aug. 8, for vocational school equipment, including metal-working machinery, power equipment, manual training benches and wood-working equipment, in accordance with specifications on file. James Storere is secretary.

The Shephard Crane & Hoist Co., Montour Falls, N. Y., has awarded a contract for the construction of its proposed new brick and steel pattern shop, one-story, 90 x 200 ft., to the Lowman Construction Co., Elmira, N. Y., at a cost of \$75,000.

The Vulcan Detinning Co., Sewaren, N. J., will build a one-story addition to its plant, about 30 x 40 ft.

The American Mine & Torpedo Co., East Orange, N. J., has been incorporated with a capital of \$100,000 to manufacture mines and allied specialties. Gordan Grand, Harry H. Picking and L. Matthews, East Orange, are the incorporators.

The Samuel L. Moore & Sons Corporation, Front Street, Elizabeth, N. J., machinists and iron founders, is having preliminary plans prepared for the erection of an addition to its plant. Ring & Gray, 280 North Broad Street, Elizabeth, are architects.

The Public Light Service Co., Bayonne, N. J., has been incorporated with a capital of \$25,000 to manufacture lighting fixtures. Edward Sweeney, Louis Lehr and Murray Bell, Bayonne, are the incorporators.

The Tisch Tool Works, 454 Spring Street, Elizabeth, N. J., will build a new one-story extension, 22 x 40 ft. Contract for erection has been awarded.

The Eagle Mfg. Co., Jersey City, N. J., has been organized to operate a plant at 18 Morris Street, for the manufacture of automobile horns. E. T. Monteleone, 73 Claremont Avenue, heads the company.

The Erie Railroad, Jersey City, N. J., has awarded contracts for the construction of a new machine shop, 30 x 150 ft., and office building at Cleveland, to cost about \$40,000.

The Federal Shipbuilding Co., Hoboken, N. J., has been incorporated with a capital of \$3,000,000 to build a shipyard on the Kearny meadows, near Newark. The company is a subsidiary of the United States Steel Corporation, and has acquired a tract of about 80 acres for the proposed plant, which will comprise an initial installation of six ways. The incorporators are Edward F. Briggs, 51 Newark Street, Hoboken, and William W. Corlett and Kenneth B. Halstead, 51 Broadway, New York.

The Star Electric Motor Co., Newark, N. J., has been incorporated with a capital of \$100,000 to manufacture motors. Carl M. and Hilmer P. Peterson and Emil Holander are the incorporators.

The Eclipse Phonograph Co., Newark, has been incorporated with a capital of \$1,000,000 to manufacture phonographs. J. T. Sibley, Newark; Charles A. Islieb, Paterson, and A. R. Winans, Brooklyn, N. Y., are the incorporators.

S. D. Layman, Newark, operating a plant at 620 Twenty-first Street, Irvington, for the manufacture of metal lasts for shoes, has filed articles of incorporation under the name of the S. D. Layman Co., with capital of \$50,000 and office at 603 Second Street, Irvington. Stephen D. Layman, J. H. Borman and George C. Lever are the incorporators.

The Diehl Mfg. Co., Elizabeth, N. J., is planning extensions to its factory, but definite arrangements have not

yet been made. It manufactures electrical apparatus and has a New York office in the Singer Building.

## New England

Boston, July 30

The current demand for machine tools maintains unabated the high record of sales, although it is a little more spotty. On certain sizes of machines the builders have been able to make a little gain on deliveries, but a flood of Government business is expected before long that will push deliveries for private industry further into the future than ever before. There has been a livelier demand for grinding machines of the precision type the past week, the companies that are to enter into aeroplane engine manufacture having placed several orders. Delivery on the smaller sizes of cylindrical grinding machines is now about November and on the larger sizes about January.

The Savage Arms Co. is reported in the market for 40-in. and 60-in. planers and for 36 to 42-in. lathes for its plant extensions at Sharon, Pa. The General Electric Co. has also been a large purchaser. New England will fill part of a list issued by the Delaware, Lackawanna & Western Railroad. The Newport Torpedo Station, Newport, R. I., is asking bids on a list of eight lathes.

The Bay State Insulated Wire & Cable Co., Boston, has been incorporated with authorized capital stock of \$300,000. The directors are John H. H. McNamee, Hyde Park, president and treasurer; Daniel T. O'Connell and M. J. Cashman.

The Crowninshield-Swasey Shipbuilding Co., Boston, has been incorporated with authorized capital stock of \$300,000. The directors are Bowdoin B. Crowninshield, president; Clarence T. Birkett, 540 West 122d Street, New York City, treasurer; and H. W. Krogman.

The Connecticut Electric Steel Co., Hartford, Conn., has taken a contract to make 1,200,000 lb. of steel castings for the New Britain Machine Co., New Britain, Conn., to be used in building anti-aircraft gun mounts. The Connecticut Electric Steel Co. will issue \$25,000 of 8 per cent preferred stock which the New Britain Machine Co. will buy at par. The latter company will advance the money to double the capacity of the plant of the steel casting company, the advance to be paid out of future profits.

The Hendee Mfg. Co., Springfield, Mass., participates with the Harley-Davidson Co., Milwaukee, Wis., in a Government contract for 5000 motorcycles at \$250 each. About 200 of the cycles will be equipped with side cars for mounting machine guns.

The Springfield Blower Co., Springfield, has been incorporated with authorized capital stock of \$3,000. The directors are Herman C. Kline, Hartford, Conn., president and treasurer; F. G. Wooden and M. A. Kline.

The Smith & Wesson Associates, Springfield, have received a contract from the Government for 100,000 revolvers for army officers. The company is extending its plant to take care of the contract.

The Gorton Pew Fisheries Co., Gloucester, Mass., has awarded a contract for a machine shop, 50 x 100 ft., one-story.

The Standard Brass & Copper Tube Co., New London, Conn., has bought in 503 shares of outstanding stock and issued \$45,000 of additional shares. The company is controlled by the Bridgeport Brass Co., Bridgeport.

The West & Dodge Co., Boston, has been incorporated with authorized capital stock of \$75,000 to manufacture tools, hardware, metal patterns and models. The incorporators are Herbert F. Dodge, president; William F. Dodge, 167 Oliver Street, treasurer; R. M. Smith and A. J. Law.

The Rodney Hunt Machine Co., Orange, Mass., has been reorganized. Carl C. Harris has bought the interest of W. O. Harris, Boston, who, with Raymond Harris, has retired from the company. Carl C. Harris becomes treasurer, continuing also as superintendent.

The Wallace Barnes Co., Bristol, Conn., is to build a five-story addition, 60 x 107 ft., with an ell, 40 x 149 ft. The company manufactures springs.

The North & Judd Co., New Britain, Conn., has purchased additional land adjoining its plant to provide for future expansion.

The Stamford Iron & Brass Co., Stamford, Conn., has been incorporated with authorized capital stock of \$10,000, to deal in steel and iron, by Paul V. Hoyer and Albert C. Smith, both of New York City, and George G. Hammill.

The Atlantic Coast Co., a new Maine corporation capitalized at \$2,000,000, has bought the shipyard of the Townsend Marine Railway & Construction Co., Boothbay Harbor, Me. The company also leases a yard at Thomaston, Me., where four ships are under construction.



## Philadelphia

PHILADELPHIA, July 30.

The American Ice Co., Sixth and Arch streets, Philadelphia, is planning for the erection of a two-story addition, 50 x 160 ft., to its wagon manufacturing works to cost about \$10,000.

The Keystone Emery Mills, 4329 Paul Street, Philadelphia, manufacturer of emery and other abrasive wheels, is taking bids for the construction of a two-story, brick and steel addition to its plant, about 36 x 100 ft.

The American Metal Works, 314 Armat Street, Philadelphia, has commenced the erection of a two-story stamping, plating and finishing shop, 60 x 320 ft., on Stenton Avenue, to cost in the neighborhood of \$100,000.

The Beacon Light Co., Chester, Pa., is building a machine shop, about 40 x 70 ft., at its new electric power station now being erected at a cost of over \$2,000,000. It is a subsidiary of the Philadelphia Electric Co., Chestnut Street, Philadelphia.

The American Steel & Wire Co., Hamilton Avenue, Trenton, N. J., has taken bids for the erection of a one-story addition to its machine shop, about 48 x 68 ft., and an extension to its wire rope works, about 175 x 310 ft.

The Department of Public Safety, Camden, N. J., will soon call for bids for a two-story municipal machine shop, to be erected on Fifth Street at a cost of about \$10,000. James H. Forsythe is chairman of the building committee.

The United States Collapsible Metallic Casket Co., Camden, N. J., has been incorporated with a capital of \$125,000 to manufacture metallic caskets. Charles H. Gandar, I. P. Perrott and George W. Litzenberg, Camden, and Albert Bradbury, Woodbury, N. J., are the incorporators.

W. H. Nicholson & Co., 12 Oregon Street, Wilkes-Barre, Pa., manufacturers of machine tools, steam fittings, etc., have taken bids for the construction of a new one-story machine shop, 53 x 175 ft., at South Wilkes-Barre.

The Bethlehem Steel Co., Bethlehem, Pa., has awarded a contract for the erection of a one-story addition, 42 x 120 ft., to be used as a centrifugal compressor shop.

The Edgemont Iron Works, Edgemont, Pa., has awarded a contract for the construction of a two-story, reinforced-concrete and brick addition, 32 x 80 ft., to cost \$20,000. E. E. Hollenback, Inc., 1804 Brandywine Street, Philadelphia, is the contractor.

The Keystone Wire Goods Co., Greensburg, Pa., has been incorporated in Delaware with a capital of \$40,000 to manufacture wire specialties. Vincent D. and Robert Edwards, and Charles J. McKnight, Greensburg, are the incorporators.

The Light Cycle Co., Pottstown, Pa., manufacturer of castings, automobile parts, etc., is having plans prepared for extensions and improvements in its plant. A. A. Hellman, Reading, is architect.

The Temple Malleable Iron & Steel Co., Temple, Pa., is taking bids for the construction of a series of 10 new foundry buildings, each one-story, brick and concrete. F. D. Case, Peoples Gas Building, Chicago, is the architect.

The Maccar Truck Co., Scranton, Pa., manufacturer of automobile trucks and parts, has completed plans for a one-story brick and concrete addition to its plant, 40 x 65 ft.

Fire, July 23, destroyed a portion of the plant of the Williamsport Iron & Nail Co., Williamsport, Pa., manufacturer of nails, spikes, etc., with loss estimated at \$100,000.

The Fisk Rubber Co., Chicopee Falls, Mass., has acquired the plant and business of the Gibney Tire & Rubber Co., Eighth Avenue and Harry Street, Conshohocken, Pa. The new owner will continue the operation of the works and is reported to be planning to increase the capacity for the manufacture of tires.

The Federal Machine Shop, Harrisburg, Pa., has commenced the operation of a new machine and general repair shop at Court and Cranberry streets.

The Autocar Co., Ardmore, Pa., has plans prepared for enlarging its plant. A five-story machine shop will be built adjoining the present factory and a sales and service building will soon be erected in Brooklyn, N. Y. J. H. Goulding, Ardmore, is the purchasing agent.

F. H. Keiser & Co., Pottstown, Pa., have the contract for the erection of the new plant of the Pottstown Steel Plate Products Co. of that city.

The Combination Lighting Unit Co., Pittsburgh, Pa., has been incorporated in Delaware with a capital of \$350,000 to manufacture lighting fixtures. W. S. Wells, S. V. Reed and David Evans, Pittsburgh, are the incorporators.

## Baltimore

BALTIMORE, Md., July 30.

The Baltimore Dry Dock & Shipbuilding Co., Baltimore, has plans for additional buildings, including a one-story brick and concrete power house, 70 x 90 ft.

The Poole Engineering & Machine Co., Woodberry, Md., is understood to be planning the construction of airplanes for the Government.

The Baltimore Tube Co., Wicomico and Ostend streets, Baltimore, have acquired two lots near its present plant, which it is understood will be used for additions.

The Symington-Anderson Co., Baltimore, has been formed with \$1,000,000 capital, to build guns for the Government. It is planned to build a plant at Rochester, N. Y., where the T. H. Symington Co. and the Symington Machine Corporation are located. T. H. Symington, who is connected with these two companies, will be president of the Symington-Anderson Co., and has an office at 1005 Maryland Trust Building, Baltimore. M. H. Anderson, formerly connected with the Bethlehem Steel Co., will be vice-president.

The Tucker Mills, Baltimore, Md., are remodeling and improving property, recently acquired, for the establishment of a plant for the manufacture of automobile tires.

The Howard E. Crook Co., 28 Light Street, Baltimore, manufacturer of boilers, etc., has recently increased its capital from \$120,000 to \$250,000.

The Bureau of Yards and Docks, Washington, D. C., has received low bids from Warren, Moore & Co., Colonial Trust Building, Philadelphia, for the construction of four new buildings at Charlestown, W. Va., as follows: One-story machine shop, 111 x 402 ft.; one-story foundry and forge shop, 135 x 562 ft.; one-story heat treatment plant, 92 x 153 ft.; and lavatory and locker rooms, 75 x 110 ft.

The District Commissioners, Washington, D. C., will build a foundry addition to the McKinley Manual Training School, Rhode Island Avenue and Seventh Street.

The De Loyd Thompson School of Flying, Washington, D. C., has been incorporated in Delaware with capital of \$100,000, to manufacture airplanes in connection with a school of instruction. George R. Collins, N. B. McCanless, Charles N. Riker and Fred S. Swindell, Washington, are the incorporators.

## Chicago

CHICAGO, July 30.

Some attractive business growing out of war needs has been placed in this city, and the majority of dealers report a satisfactory volume of orders, with small buying a trifle lighter.

Large orders have been placed by the Wisconsin Gun Co., Milwaukee, Wis., a new organization, which is to manufacture 3-in. field pieces for the Government. The guns are to be made of heat-treated alloy steel forgings, delivered to the company rough bored. Milwaukee capital is behind the enterprise. Deliveries will be given precedence over orders from the industrial field.

The Nash Motor Co., Kenosha, Wis., which has a Government contract for 3000 truck chassis, has been in the market for a considerable number of tools, and the Harley-Davidson Motor Co., Milwaukee, which received a large order for motor cycles, is expected to become a factor in buying, although not to a great extent, inasmuch as it has a complete equipment. A large machine-tool manufacturer in Wisconsin is reported to have Government orders, to which fact is attributed the recent purchase of several machine tools by the company in question.

A Michigan machine-tool builder is busy making machines for the Government which greatly facilitates breech work on large guns, inasmuch as it obviates the necessity of moving the heavy pieces and permits work to be done on a number of guns in a comparatively small space.

Salesmen are finding it more difficult to get over their territories because of the number of passenger trains which the railroads have discontinued. It is especially difficult to cover the smaller towns, and more day travel is found necessary. Even interurban electric lines have cut down their service in some instances.

Orders for tractors of the caterpillar type, valued at several millions of dollars, have been practically placed with Illinois manufacturers by the British Government, but builders do not want to give any specific information concerning the orders until transactions are completely closed. The value of one order will approximate \$1,250,000. Additions to shop equipment will be a probable result. The orders were divided among four companies. The Moline Plow Co. has been buying for its tractor department.

It is quite generally conceded that buying for the Rock Island Arsenal will be done in the East.

The railroads are practically out of the market. The Santa Fe wants a double-head bolt cutter of  $\frac{3}{8}$  to  $2\frac{1}{4}$ -in. capacity. Punches and shears are exceedingly difficult to procure because of the absorption of those machines by shipyards. One maker cannot promise deliveries earlier than the first quarter of 1918. A leading maker of grinding machines has advanced his prices 10 per cent.

The Superior Steel Castings Co., Benton Harbor, Mich., is working night and day on a Government order for castings to be used in the manufacture of guns of 4-in. caliber.

A factory, 100 x 160 ft., to cost \$150,000, is being built at Fullerton and Racine Avenues, Chicago, for the Standard Cap & Seal Co. O. N. Tevander is president. Davidson & Weiss are the architects.

McCord & Co., Chicago, manufacturers of railroad equipment, have purchased from the Illinois Central Railroad a tract of  $3\frac{1}{2}$  acres, in West Pullman, part of which is improved with large buildings, one of which the purchasers have occupied for the manufacture of journal boxes.

Plans will soon be completed for a three-story reinforced concrete factory, 51 x 112 ft., in Twenty-seventh Street, near La Salle Street, Chicago, for Adolph C. Ehman, president, Vail Rubber Co. and the Ehman Tire & Rubber Co., to cost about \$30,000.

Bids are being taken by S. N. Crowen, 30 North La Salle Street, Chicago, for a one and two-story mill construction factory at Argo, Ill., for the Elgin Motor Car Corporation.

The Chicago Fuse Mfg. Co., Chicago and New York, is having plans made by a New York architect for a factory at Morgan & Congress Streets, Chicago. The site is 119 x 125 ft.

The Belden Mfg. Co., 2300 South Western Avenue, Chicago, manufacturer of insulated wires, has awarded the general contract for a one-story factory, 92 x 127 ft., in West Van Buren Street. This is the initial building of a plant to cost \$250,000.

The Alexander Railroad Crossing Co., Clinton, Ill., has purchased a site at Chicago Heights, Ill., where it will manufacture railroad crossings and other railroad specialties.

Bids have been taken for the general work on an industrial school, Twenty-second Street and Harlem Avenue, Riverside, Ill., for the Chicago and Cook County School for boys. The cost was estimated at \$250,000, but all bids exceeded the appropriation, and it is probable that a part of the work will be postponed.

Frank D. Chase, architect and industrial engineer, 122 South Michigan Avenue, Chicago, has been retained to prepare plans for a malleable iron foundry at Temple, Pa., to cost between \$300,000 and \$400,000. The plant probably will comprise five buildings of brick, steel and concrete construction.

The Peoria Malleable Castings Co., Peoria, Ill., has purchased  $16\frac{1}{2}$  acres for its new malleable iron plant. Plans have been prepared for two main buildings, 120 x 200 ft. and 100 x 220 ft., respectively, as well as for several smaller buildings. H. Hemmingway, Beloit, Wis., is vice-president and general manager.

The Moore Motor Vehicle Co., Danville, Ill., has been incorporated with a capital stock of \$100,000. It is established in a plant at Danville, and is assembling 100 machines, parts for which were made in Minneapolis. George L. Moore is president.

The Calumet Machine & Casting Co., Chicago, Ill., has been incorporated in Delaware with a capital of \$250,000, to operate a foundry and manufacture machinery. Samuel C. Rowland and Harry Lewis, Chicago, are the incorporators.

## Milwaukee

MILWAUKEE, WIS., July 30.

The demand upon machine tool builders is largely confined to metal-working shops which hold Government contracts. Orders come from every part of the country and consist mainly of single tools or small lots, covering the entire list of types and sizes. No large inquiries have appeared, but it is intimated that several of considerable volume are in prospect. No purchases have as yet been made directly on Government account, so far as can be learned, nor have local tool builders experienced any signs of Federal control of their works up to this time. The closest scrutiny is being given every order so that machines required for Government contract work may receive the proper attention. Requirements of buyers are checked up officially by the makers, who keep in close touch with the War Munitions Board. A considerable number of bookings made in recent days indicate that users are anticipating their requirements. During the

last week or more buyers who placed orders some time ago have become more and more urgent and all shops in this district are subjected to strong pressure for deliveries.

Stanley F. Kadow, architect, 988 Kinnickinnic Avenue, Milwaukee, has been engaged to prepare plans for a foundry and machine shop, to be erected in or near Milwaukee by a new concern, the name of which is withheld for the present. The main building is to be ell-shaped, 80 x 163 and 30 x 163 ft., and an office building, 26 x 50 ft., will also be erected.

The B-V Milking Machine Co., Milwaukee, has been organized with a capital stock of \$150,000 to establish a plant for the manufacture of automatic milking machines, barn and dairy equipment. The incorporators are H. F. Bodecker, Charles E. Somers and A. G. Langlois. An architect will be selected soon.

The Wisconsin Duplex Auto Co., Clintonville, Wis., organized recently, with capital stock of \$500,000, to manufacture a quadruple drive chassis for passenger cars and trucks, is completing the first models in a Milwaukee machine shop under the direction of William A. Besserlich, president and general manager, who designed the transmission system. Contracts for the erection of the first unit of a new plant at Clintonville will be awarded within a few weeks. Mr. Besserlich was one of the original designers of the Four Wheel Drive truck, and with W. S. Zachow organized the Four Wheel Drive Auto Co., Clintonville, Wis., now capitalized at \$1,000,000. He withdrew recently to engage on his own account in the manufacture of a new design.

The Simple Gas Engine Co., Ashland, Wis., manufacturer of light gas and oil engines of the stationary and portable type, has completed the removal of its works and offices to Menasha, Wis., and has resumed operations in its new quarters. The articles of incorporation have been amended to change the official headquarters from Ashland to Menasha.

The Fitzsimmons Steel Products Co., 530-580 Park Street, Milwaukee, has awarded contracts for the construction of a one-story foundry and warehouse addition, 75 x 150 ft., of steel and brick.

The Gilson Mfg. Co., Port Washington, Wis., founder and machinist, has taken a contract for manufacturing 5000 light type garden tractors for the Beeman Garden Tractor Co., Minneapolis, Minn., delivery to begin Sept. 1.

The Appleton Auto Body Co., Appleton, Wis., organized in February to manufacture open and closed automobile bodies, truck bodies, etc., has increased its capital stock from \$10,000 to \$25,000 in preparation for the erection of a two-story plant, consisting of metal, sheet metal and wood-working shops, costing about \$20,000. Work will begin shortly after Aug. 1 and the plant is to be ready Oct. 1. C. Gustave Seeger is general manager.

Joseph Wulff, machinist and blacksmith, Mondovi, Wis., will enlarge his shop and install a new electric motor and a number of machine-tools.

The T. & M. Mfg. Co., Oshkosh, Wis., which is the reorganization of the Termaat & Monahan Co., Oshkosh, maker of marine and stationary engines, lathes, etc., reopened the works the past week under the direction of Myron C. Kline, formerly of the Jacobson Machine Co., Warren, Pa., who has been appointed works manager. A force of 65 men is working full time.

Joseph Weasler, Campbellsport, Wis., is organizing a company to manufacture a metal scaffold for use in the construction of silos, smokestacks, water towers, elevators and other high structures, and a hoist for general construction purposes.

The Goodrich Transit Co., Chicago and Milwaukee, probably will continue to make Manitowoc, Wis., the headquarters of its repair yards, winter storage and machine-shops, the local Chamber of Commerce practically having concluded negotiations for a new site in the inner harbor. The present yards are leased from the Manitowoc Shipbuilding Co., which is building new shops and docks to increase the capacity about 100 per cent to adequately handle Government contracts. The Goodrich company will expend between \$50,000 and \$100,000 in establishing a new plant.

The Silent Washer Co., Clintonville, Wis., has amended its articles to provide for an increase in its capital stock from \$15,000 to \$25,000, and changing its location from Appleton, Wis., to Clintonville, where a new factory will be erected at once.

The J. I. Case Threshing Machine Co., Racine, Wis., is building a \$15,000 addition to its South works in Lakeside, at the southern limits of Racine.

The Wasson Trolley & Mfg. Co., Milwaukee, has been incorporated with a capital stock of \$50,000 by Frank A. Wasson, Charles Pfeiffer and D. R. Moore. Mr. Wasson is general manager of the Wasson Engineering & Supply Co., 216 West Water Street.

The Lasure Friction Clutch Co., Watertown, Wis., formerly the Lasure Clutch Co., Madison, Wis., has completed its



reorganization incident to the removal of the plant and headquarters from Madison to Watertown, and elected the following officers: President, R. L. Richardson; vice-president, A. D. Platz; secretary-treasurer, B. M. Parsons; directors, Edward L. Schempf and A. M. Peltier. The company resumed operations in its new plant July 28, having equipped the former Dornfeld Iron Works shop on Fifth and Market streets, Watertown.

The Edgerton Barn Equipment Co., Edgerton, Wis., has completed its organization by the election of the following officers: President, H. C. Schmeling; vice-president, E. M. Ladd; secretary, H. H. Drew; treasurer, T. A. Ellingson. The company takes over the business of the Drew Barn Equipment Co., but will establish a new plant as soon as possible.

The Charles Skidd Mfg. Co., Kenosha, Wis., is completing the removal of its works and offices to Janesville, Wis., where it is occupying one of the larger buildings of the former Wisconsin Carriage Co., now the Janesville Products Co. Operations will be resumed in the new plant Aug. 1. The Skidd company manufactures dairy machinery, pasteurizers, coolers, etc.

The Independent Foundry Co., West Allis, Milwaukee, will select an architect to design its proposed new \$20,000 gray iron shop about Aug. 1. It is hoped to start construction work about Aug. 15 or Sept. 1. August M. Fons is secretary.

The Kahlenberg Co., Two Rivers, Wis., manufacturer of gasoline and kerosene engines for marine and stationary duty, is now building crude oil engines designed by William R. Kahlenberg, chief engineer, embodying a new igniter tube.

The Federal Tractor Co., Inc., Minneapolis, Minn., has recently been organized and is temporarily occupying a factory building in St. Paul for the manufacture of "Tom Thumb" farm tractors. It is said the company plans to build two plants, one in the Southwest and one near St. Paul or Minneapolis, the exact site not having yet been selected. This tractor is of the caterpillar type. Albert A. Robbins is secretary and treasurer of the company.

## Detroit

DETROIT, July 30.

The machine tool market continues to show improvement. A large number of fair-sized orders were placed last week, and numerous inquiries were received. Manufacturers in this section, especially brass, copper, steel and aluminum companies, are operating at capacity. Shipyards have orders for months ahead, and have increased their production to the utmost. Iron miners in the northern part of the State are causing trouble. On one large range, all miners have stopped work until wages are raised. State officials have taken a hand, and it is probable the trouble will be adjusted within a short time.

The ordering of munitions for the Government is under way. One large body factory is now ordering material which will enable it to turn out bodies for 150 airplanes a day, exclusive of engines. The Packard Motor Co. has received orders for 2000 trucks for war purposes. Three other truck companies in Detroit are expecting war orders for 1000 trucks each. The manufacture of airplane engines will begin on a large scale within a short time.

The Grand Trunk Railway has issued an order for an additional freight car repair shed at Port Huron, Mich., to be 150 x 360 ft. It will employ more than 800 men, and is expected to be completed about Oct. 1.

The Edward F. Lyon Co., Detroit, has been equipped to manufacture axle shafts for automobiles.

The Perlman Rim Co., formerly of New York, is installing machinery in its factory at Jackson, Mich., which will be the headquarters of the company. The Jackson factory will be enlarged.

The Alamo Mfg. Co., Hillside, Mich., has been re-incorporated under the name of the Almo Engine Co., with capital stock of \$300,000.

The Lloyd Mfg. Co., Menominee, Mich., manufacturer of furniture, will shortly begin additions to its plant.

The National Engineering Co., Saginaw, Mich., manufacturer of automobile accessories, has increased its capitalization from \$30,000 to \$200,000. T. Monte Carpenter is resident manager.

The Hagaman-Storrs Co., Bay City, Mich., manufacturer of tools, jigs and automobile parts, will shortly move into larger buildings.

The Pierce-Budd Motor Co., Bay City, Mich., has been reorganized and the business will be expanded. It manufactures boat engines, and expects to develop an aeroplane engine.

The Grand Rapids School Equipment Co., Grand Rapids, Mich., has secured a Government contract for 6000 auto truck bodies, to be finished within seven months. The contract amounts to more than \$1,000,000, and means the employment of several hundred additional men.

The Electric Power & Equipment Co., Grand Rapids, Mich., will be incorporated shortly to manufacture motors and do a general electrical business. Joseph Brown is president.

The Universal Auto Top Co., Grand Rapids, Mich., has been incorporated with a capital stock of \$25,000 to manufacture the Universal top. The incorporators are William E. Pugsley, Leon S. Carrel, Clyde Vandenburg and Robert Luce.

The Manistee Iron Works Co., Manistee, Mich., is erecting an addition to its plant, and will employ 200 additional men.

The American Fork & Hoe Co., Jackson, Mich., is erecting a three-story factory to cost \$24,000, to be completed Oct. 1.

The Parker Mfg. Co., 410 Ker Building, Detroit, has been organized to manufacture machined products. The capital stock is \$75,000, all paid in.

The St. Louis Foundry Co., St. Louis, Mich., has been taken over by J. I. McCormick, Orville Allen and C. L. Graham, Alma, Mich., who will reorganize it under the name of the Gratiot Foundry Co.

The Maxwell Motor Co., Detroit, will build a branch plant at Windsor, Ont., to cost \$150,000.

Plans are being completed for a factory, 70 x 236 ft., for the Triangle Motor Truck Co., St. Johns, Mich. It is expected that the building will be completed about Sept. 1. F. Von Thurn, Fildew Building, Walker Street, St. Johns, is general manager.

It is reported that the Chicago Stove & Range Co. is to locate at Benton Harbor, Mich. A 10-acre site has been secured, and several brick buildings will be erected.

## Cleveland

CLEVELAND, July 30.

The volume of machine tool business has been fairly heavy the past week in spite of an absence of round-lot orders. Business has come from widely scattered sources, although a fair share is being placed by companies that have taken sub-contracts for airplane parts. Makers of tools, jigs, and dies are also buying freely. There is a very active inquiry for heavy machinery for Government work. The Platt Iron Works, Dayton, Ohio, is inquiring for 20 30 to 36-in. lathes for rough turning 3-in. guns. A number of other inquiries, so far of a rather indefinite nature, came out the past week for pending Government work. A heavy demand is noted for boring mills and planers for the Government, but some lines, including power presses and turret lathes, have so far not been stimulated to any great extent by Government orders. Some railroad business has come out, among which were two 26-in. turret lathes, purchased by the Baltimore & Ohio Railroad for its Newark, Ohio, shops. The American Brake Shoe & Foundry Co., Erie, Pa., is understood to have purchased a large amount of machinery the past few days. This company came into the market recently for about 240 machines for shell work. A round lot of machinery equipment was also placed during the week by the Cleveland Pneumatic Tool Co., which is building a new plant.

The Ohio Blower Co., Cleveland, will erect a plant in Orville, Ohio, where it will manufacture its present line of steam specialties and add some new products. A one-story foundry, 100 x 100 ft., and a machine shop, 60 x 200 ft., will be erected. Some new equipment will be required.

The Grant Motor Car Co., Cleveland, will begin the erection of a one-story concrete addition, 60 x 260 ft., to be used as a machine shop, painting and enameling department. Plans have been prepared by the W. S. Ferguson Co., architect, Cleveland. The company has under consideration the erection of five additional buildings, which may be started later this year.

The Guide Motor Lamp Co., Cleveland, has acquired a 5½-acre site on Mandalay Avenue, Northeast, near the Nickel Plate Railroad and East 152d Street, on which it contemplates the erection of a new plant shortly, having outgrown its present quarters at 11400 Madison Avenue.

The Defiance Machine Works, Defiance, Ohio, has increased its capital stock from \$600,000 to \$1,200,000, and has acquired adjoining property on which it will erect additional two-story brick and concrete buildings, in addition to enlarging its machine shop. Special metal-working machinery will be added to its present line of wood-working machinery. Some changes in the organization have re-

cently been made; R. P. Kettenring is vice-president, and George A. Ensign and W. F. McCarty, works manager and chief engineer, respectively.

The Fulton Pit Car & Mfg. Co., Canal Fulton, Ohio, which recently increased its capital stock from \$150,000 to \$400,000, states that the increase was made to complete the recently announced merger of that company with the Kenova Mine Car Co., Kenova, W. Va.

The Rex File Co., Newcomerstown, Ohio, has been incorporated with a capital stock of \$200,000, and will succeed the company of the same name which was in business in Newcomerstown until recently, when its plant was destroyed by fire.

The Banner Machine Co., Columbiana, Ohio, has abandoned its plan to move its plant to East Palestine, Ohio, and will build a foundry and machine shop in Columbiana.

The Sunbury Mfg. Co., Sunbury, Ohio, has acquired a new site on which it will build a plant, 70 x 120 ft., for the manufacture of car loading and unloading equipment.

The O'Neil Tire & Rubber Co., Akron, Ohio, will build a new plant, providing 20,000 sq. ft. of floor space.

The Fulton Foundry & Machine Co., Cleveland, has taken over all of the assets and good will of the Fulton Foundry Co.

## Indianapolis

INDIANAPOLIS, July 30.

The Nordyke & Marmon Co., Indianapolis, manufacturer of milling machinery and automobiles, is enlarging its plant to engage in the manufacture of motors for aeroplanes. It is expected the company will become one of the largest builders of aircraft motors. Howard Harmon is Government supervisor of motor construction.

The Hammond Optical Machine Mfg. Co., Vincennes, Ind., has increased its capital stock from \$15,000 to \$30,000.

The Standard Electric Mfg. Co., Indianapolis, has increased its capital stock from \$100,000 to \$300,000.

The Gary Co-operative Association, Gary, Ind., has been incorporated with \$10,000 capital stock, to deal in machinery, tools, etc. The directors are Andrew Schoppel, Vasil Vangeloff and John Kraft.

The Peru Foundry Co., Peru, Ind., has been incorporated with \$60,000 capital stock, to conduct a general foundry business. The directors are M. F. Gartland, J. H. Schaumleffel, John C. Haswell, John P. Whalen and Frank X. Gartland.

A plant for the manufacture of motors and dynamos is planned for South Bend, Ind., as a subsidiary of the Marble Arms & Mfg. Co. John F. Card, Three Rivers, Mich., is the head of the enterprise.

A one-story foundry, 65 x 132 ft., will be built by the Fulton Brass Foundry Co., 1508 South William Street, South Bend, Ind.

The Beatty Mfg. Co., recently incorporated at Indianapolis, Ind., has purchased a 4-acre tract at Hammond, Ind., and has let the contract for a factory to cost about \$50,000. The company will manufacture heavy machinery, including a bulldozer for forge work. W. R. Beatty is president.

The Columbus Machine Works, Columbus, Ind., recently incorporated, will manufacture the Columbus portable pipe machine.

## Cincinnati

CINCINNATI, July 30.

A heavy demand exists for large machine tools, including radial drilling machines, lathes, from 24 in. up, and planers. Shaping machines are the only small machine tools wanted, and firms making these have enough work ahead to keep them busy for some time to come. Shipbuilding companies are quietly buying more machines than heretofore, and it is not often that an inquiry is sent broadcast when a large machine tool is needed. The question of delivery is one of the most important ones. Auto-truck manufacturers are also buying on the same basis, and much work is in hand, or under negotiation. The slack demand for small lathes is due, to an extent, to the absence of buying on the part of repair shops and small manufacturers.

The local labor situation is satisfactory, but frequent reports from foundries in Hamilton, Ohio, are somewhat disconcerting. Some molders who were out returned to work on Monday of last week, but struck again the following Thursday. The demands made are ostensibly for a formal recognition of the union.

The L. Schreiber & Sons Co., Cincinnati, has contract for an addition to the plant of the Springfield Light, Heat & Power Co., Springfield, Ohio.

It is reported that the plant of the former Cincinnati

Equipment Co., Sedamsville, Cincinnati, will resume operations at an early date. Ernest W. Volz is interested in a new company formed to remodel the plant.

The Dayton Electrical Mfg. Co., Dayton, Ohio, is removing its plant to a building on Fourth Street, and intends to increase its capacity.

The Gondolo Mfg. Co., Springfield, Ohio, has been incorporated with \$10,000 capital stock by H. E. Stimmel and others to make special machinery. Nothing is known as to its machinery requirements.

Plans are under way for an addition to the plant of the C. A. S. Products Co., Columbus, Ohio, manufacturer of motor truck parts.

The Capitol Milling Co., Columbus, Ohio, has been incorporated with \$150,000 capital stock, and will increase the capacity of its plant on West Mound Street. L. C. Titus is president.

The American Tool & Mfg. Co., Urbana, Ohio, has acquired a site near its plant on which it will erect a building to augment its output of automobile specialties.

It has been definitely announced that the Elgin Tractor Co., Elgin, Ill., will remove its plant to Piqua, Ohio, and will occupy the former building of the Piqua Rolling Mill Co. It is the intention to more than triple the present output of farm tractors.

The Kenney-McGreevy Foundry Co., Mansfield, Ohio, has been incorporated with \$20,000 capital stock by H. D. Kenney and others.

The Mid-West Box Co., Anderson, Ind., is making a one-story addition to its plant, 32 x 64 ft. Part of this will be used as a machine shop.

## The Central South

LOUISVILLE, KY., July 30.

High prices are tending to slow up general machinery business in this territory, although Government contracts are supplementing the volume handled. There is a strong demand for second-hand equipment. Coal and oil development operations continue to create considerable demand for equipment and supplies.

The Continental Car Co., Louisville, has been awarded a Government contract to make 2000 motor truck bodies. A. B. McKinley is general manager.

The Southern Machine Exchange, Somerset, Ky., is in the market for a 50-hp., alternating current, 220-volt electric motor and a 50-hp. oil or kerosene engine.

The Hercules Buggy Co., Evansville, Ind., has contracted with the Government to furnish 4500 motor truck bodies.

The John G. Duncan Co., Knoxville, Tenn., is asking for dealers' prices on a 75-hp. direct current motor, in first-class condition, for immediate delivery.

## Birmingham

BIRMINGHAM, ALA., July 28.

Dealers report a good machinery market. The demand from the Alabama graphite field, especially for electric apparatus, is continuous, owing to the building of new mills in that rapidly developing industry. The sawmill demand is also good, and pumps and gasoline engines are selling actively.

The Aluminum Co. of America, Badin, N. C., will build a second dam at Yaddin Falls and a power house containing three 10,000-hp. units.

The Fernandina Shipbuilding & Dry Dock Co., Fernandina, Fla., capital stock \$1,000,000, has been organized, and has purchased land on the water front. It proposes to construct a shipbuilding plant.

The Tampa Shipbuilding & Engineering Co., Tampa, Fla., contemplates the erection of a third machine shop, a pipe-bending shop, a joiner shop and a sawmill.

The Dierke-Blodgett Co., Pascagoula, Miss., will build a shipyard on the Pascagoula River.

## St. Louis

ST. LOUIS, July 30.

Industries engaged in the production of various supplies for Government use are constantly in the market for additions to their equipment. All dealers are sold up to capacity to deliver and far ahead. New business is limited by buying opportunities rather than by any other feature.

The Mueck Auto Body Co., St. Louis, has been incorporated with capital stock of \$30,000 by Frank J. Mueck, Henry J. Happel and William Happel to manufacture vehicle bodies and is in the market for equipment.



The Auto Traffic Signal & Mfg. Co., St. Louis, has been incorporated with capital stock of \$25,000, by Alfred A. Krause, Walter G. Krause and Arno D. Krause, to manufacture tools, machinery, auto parts, etc.

The Girtanner Mfg. & Sales Co., St. Louis, has been incorporated with capital stock of \$20,000 by Fred Girtanner, Herman Mueller and L. L. Kraft, to manufacture power-house supplies and accessory equipment.

The St. Louis Washing Machine Co., Red Bud, Ill., has been incorporated with capital stock of \$25,000, by L. I. Ziehlmann, Herman Eggerding and F. W. Buch, to manufacture machinery.

The Four States Lumber Co., Texarkana, Ark., L. W. Krause, manager, is in the market for boilers and other power plant equipment.

The Drexel Oil & Gas Co., Pawhuska, Okla., H. P. White, manager, is in the market for oil pumping power plants.

The Traders Oil & Refining Co., Baltimore Building, Oklahoma City, Okla., is in the market for equipment for an oil refining plant, boiler, steam still, tanks, pumps, etc.

The Triangle Mines Co., Miami, Okla., J. D. Bomford, manager, is in the market for mill machinery, power plant, oil engines, etc.

The Henryetta Public Service Co., Henryetta, Okla., has been incorporated with capital stock of \$200,000, by J. R. Watson, A. W. Anderson and Harlan Reed, all of Okmulgee, Okla., and will equip an electric plant.

The Hine-Hodge Lumber Co., Hodge, La., will equip a shipbuilding plant at Moss Point, Miss., where a site has been acquired.

The Jonesville Lumber & Veneer Co., Jonesville, La., A. W. Stewart, president, is in the market for boilers and other power plant equipment, including two engines, etc.

The Forschler Motor Truck Mfg. Co., New Orleans, La., will erect a building, 147 x 220 ft., for the manufacture of motor trucks.

The Ged Iron Works, Ged, La., recently incorporated, was first organized with \$7,500 capital stock, which later was raised to \$10,000.

## Texas

AUSTIN, TEX., July 30.

The machinery and tool trades continue unusually active despite the intense heat. The demand for cotton gin machinery is showing an increase and a number of cotton gins will probably be built before the cotton harvest is fairly open.

The Westminster Gin & Development Co., Westminster, will build a cotton gin to cost about \$8,000. W. W. Eubanks, Westminster, is a stockholder.

The Texas & Pacific Coal Co., which has developed a natural gas supply amounting to more than 50,000,000 cu. ft. per day from 28 wells, near Thurber, will lay a pipe line to Fort Worth and Dallas. Edward L. Marston, a banker of New York, is president of the company.

The Dayton-Goose Creek Railway Co., Dayton, has been incorporated to construct a railroad between Dayton and Goose Creek, a distance of about 30 miles. The cost of building and equipping the road will be about \$400,000. R. S. Sterling, W. S. Parrish, W. W. Pondren and R. L. Blaffler, all of Houston, are among the incorporators.

The Memphis Cotton Oil Co., Memphis, which has increased its capital stock from \$75,000 to \$200,000, all paid in, will spend about \$125,000 in enlarging its plant. A new building will be erected and machinery installed.

There are now in active operation five shipbuilding plants at Orange, Tex. These include International Shipbuilding Co., the Orange Maritime Co., the Southern Dry Dock & Shipbuilding Co., the Sabine-Neches Shipbuilding & Navigation Co., and the National Shipbuilding Co. With the exception of the International Shipbuilding Co., all of these companies are backed by Orange capital. It is said that they have, in all, contracts for 54 vessels, including a large number for the Emergency Fleet Corporation.

## California

LOS ANGELES, July 24.

The Crellin Machine Co., 121 Railroad Street, Los Angeles, manufacturer of tools, has filed plans for a new one-story machine shop, 32 x 100 ft., at 123 North Railroad Street. C. W. Crellin is head.

The Warman Steel Casting Co., Los Angeles, specializing in the production of electric and crucible steel castings, has completed the erection of a new foundry at Boyle and Slauson avenues.

The California Sprayer Co., Los Angeles, has been incorporated with a capital of \$45,000 to manufacture spraying equipment. John S. Davis, 6029 Pasadena Avenue, is the principal incorporator.

The United States Spring Co., 1120-22 South Los Angeles Street, Los Angeles, has leased property adjoining its plant for the erection of an addition. Plans have been prepared for a one-story building, about 50 x 150 ft., for the different operating departments. The present building will be used exclusively for manufacturing, specializing in the production of springs for automobiles and automobile trucks. It is said that new machinery will be installed to increase the capacity, including six new furnaces.

The Baker Iron Works, 950 North Broadway, Los Angeles, specializing in structural steel, sheet steel and foundry work, has recently completed an addition.

The American Aircraft Co., Los Angeles, has been incorporated with a capital of \$10,000 to manufacture different types of aircraft. The incorporators are Joseph Mattingly, 540 Indiana Avenue, Venice; Roy Bower, Quincy, and H. King, 4501 Marmion Way, Los Angeles.

E. A. and George White, Oakland, are negotiating with the city officials at Redondo Beach, near Los Angeles, for the establishment of a shipbuilding plant to cost about \$300,000.

The Pacific Electric Railway Co., Pacific Electric Building, Los Angeles, has awarded contract for the construction of a one-story car repair shop, 163 x 163 ft., at Echandia Junction, to cost about \$10,000.

The California Automatic Sprinkler Co., Los Angeles, has been incorporated with a capital of \$10,000 to manufacture automatic sprinklers for agricultural purposes. M. J. and J. R. Spencer and A. A. Sturges are the incorporators.

## The Pacific Northwest

SEATTLE, WASH., July 24.

With few exceptions, notably that of the lumber industry, every manufacturing plant in the Northwest is busy, with many operating two and three shifts daily. The increase is particularly noticeable in the machine shops, and the larger plants have booked orders that will keep them busy for months to come. It is stated that foreign orders booked with Seattle plants run as far ahead as 1919. The problem of obtaining raw materials is likely to become a serious one, but the shortage has not been extreme as yet.

Seattle's water-borne commerce for the first six months of this year aggregated \$250,237,362, or a gain of more than \$55,000,000 over the same period of 1916. The bulk of the increase was in foreign trade, with domestic commerce recording a vigorous gain.

The Thomas Pulp & Paper Co., Portland, Ore., capitalized at \$500,000, has selected Aberdeen as the site for a pulp and paper plant to be erected at once. A power plant is also included in the plans. R. Thomas heads the company.

The Lumbar Products, Ltd., New Westminster, B. C., which has taken over the Iowa Lumber Co.'s plant and properties, will make improvements and additions, including the installation of a new saw mill. It will operate a box factory, and has purchased the North Vancouver toy factory, which will be enlarged and brought to New Westminster.

The plant of the Tacoma Fir Door Co., Tacoma, Wash., was completely destroyed by fire recently, with a loss of \$150,000.

The Ship Lumber Co., Tacoma, Wash., recently incorporated, has purchased a site on the waterfront, and will erect a lumber mill, with a daily capacity of 50,000 ft.

The Allen Shipbuilding Co., Seattle, has been incorporated by C. J. Smith, Frank P. Allen, N. Paschall, Robert P. Greer and F. K. Smith, and has acquired a site on Salmon Bay, on which will be established a wooden shipbuilding plant. Four ways will be installed.

S. Matheson, Vancouver, B. C., has opened an office at 517 Rogers Building, for the Vancouver Shipyards & Engine Works, Ltd., composed of Eastern capital of \$750,000. It is reported a deal is pending for a shipbuilding site where wooden vessels will be constructed.

The National Home Building Co., Vancouver, Wash., manufacturer of knockdown houses and boxes, will double the capacity of its plant and install new machinery, with individual motors.

Kruse & Banks, Marshfield, Ore., will install new machinery at their shipbuilding plant, including a large electric crane.

The W. E. Boeing Airplane Co., Hoge Building, Seattle, contemplates extensions and improvements to its factory on

Lake Union. The plans include a two-story machine shop, 84 x 88 ft., office building, and concrete vault.

It is reported that the Victoria Machinery Depot, Victoria, B. C., has received contracts for the construction of all the boilers required for the wooden steamers that will shortly be under way for the British Government. The company will make a specialty of boiler construction.

The Port of Portland, Portland, has completed plans for the erection of bunkers and the installation of coal handling machinery, and for the construction of a number of ocean going barges with a capacity of 800 tons each.

The Pacific Lifeboat Co., Portland, has been organized and will equip a three-story factory on East Water Street, with rail and water communication. V. A. Crum is president and H. F. Gallimore secretary-treasurer.

The Supple-Ballin Shipbuilding Co., Portland, has been incorporated with a capital stock of \$300,000 by Joseph Supple, Fred A. Ballin and Arthur Languth.

The Gray & Barash Co., Seattle, has secured a site, covering an entire block of waterfront property, on which will be erected a plant for manufacturing electrical and nautical machinery.

The Pacific Northwest Mfg. Co., Seattle, Wash., has been incorporated with a capital stock of \$100,000 by W. L. Specklemier, F. T. Coulter and D. B. Thompson, to manufacture furniture.

The Griswold-O'Donnell Co., Portland, has leased a site at Vancouver, Wash., with 1500 ft. of river frontage on which a shipbuilding plant will be erected. Four shipways for wooden vessels will be put in at once, and a saw mill will be added later. E. A. Griswold is president; M. J. O'Donnell, vice-president, and Clarence M. Eubanks, secretary.

The Tregoning Boat Co., Seattle, Frank C. Tregoning, president, will install a shipbuilding plant at Portland.

The Ames Shipbuilding & Dry Dock Co., Seattle, which has three steamers of 8800 tons capacity on the ways, and nine others to follow, is in the market for additional machinery, and for large and small wood-working tools.

The Oregon Shipbuilding Co. and the Motor Ship Construction Co., Portland, have been consolidated.

## Canada

TORONTO, July 30.

The Eastern Machinery Co. of Montreal, Montreal, has increased its capital stock from \$45,000 to \$95,000.

Armstrong, Whitworth of Canada, Ltd., Montreal, shipbuilders and iron and steel manufacturers, have been granted a license to do business in the province of Ontario with a capital stock of \$40,000. Elias T. Malone, Bay and Melinda streets, Toronto, is the attorney.

The Watson Specialties, Ltd., Brantford, Ont., has been incorporated with capital stock of \$150,000 by Alexander Greig, John M. Sparrow of Toronto, Frank Kent of Meaford, Ont., and others, to manufacture screens, metal frames, wardrobes, office furniture, etc.

H. W. Petrie, Ltd., Toronto, is in the market for motors, 60-cycle, three-phase, 550 volts, in sizes up to 75 hp.; also a lighting outfit, 50 or 60 hp., high-speed engine, direct connected to 110-volt generator.

The Packard Electric Co., St. Catharines, Ont., is in the market for a power squaring shear to cut No. 10 gage steel up to 24 in. wide.

The directors of the Canada Malleable & Steel Range Co., Oshawa, Ont., have decided to dispose of their plant.

Bids have been called by the Canadian Shovel & Tool Co., Imperial Street, Hamilton, Ont., for the erection of an addition to cost \$30,000.

Work has been started in transforming the old customs building at Cobourg, Ont., into a factory for the Bird-Archer Co., manufacturer of boiler supplies, etc.

The Muskoka Foundry Co., Bracebridge, Ont., will make an extension to its foundry at a cost of \$15,000.

The Brantford Computing Scale Co., Brantford, Ont., has purchased a site adjoining its factory, and it is reported extensive additions will be made, including the erection of a foundry.

The Cameron-Genoa Mills Shipbuilders, Victoria, B. C., which recently received contracts from the Imperial Munitions Board, Ottawa, for the erection of four ships, will enlarge its plant.

The Cotton Co., Ltd., Vancouver, B. C., will erect a shipbuilding plant at False Creek, Vancouver, B. C.

A. F. Bernstein, Vancouver, B. C., is contemplating the establishing of a smelter and steel works at Port Coquitlam, B. C., estimated to cost \$500,000.

John A. Moody, London, Ont., is in the market for a Crown wheel, 2 ft. in diameter; also a Fitzgibbon marine boiler, anchor, chains and cables, etc.

The Frederick Thompson Co., electrical engineer, will erect a four-story factory, 60 x 104 ft., at 7-11 St. Genevieve Street, Montreal, to cost \$30,000.

The John Morrow Screw & Nut Co. has started the erection of an addition to its plant at Ingersoll, Ont., to cost \$30,000.

Engineer Calder, Swift Current, Sask., has recommended the purchase of a 75 hp. auxiliary induction motor, at a cost of \$2,000; and also repair parts for pumps, etc. The recommendations were adopted by the council.

A group of Western men, headed by James Playfair of the Quebec Shipbuilding Co., Quebec, proposes to establish a steel shipbuilding plant on the St. Charles River.

The Canadian Ford Motor Co., Windsor, Ont., has purchased additional land near its plant, and is contemplating extensive additions.

The Canadian Brass Co., St. Catharines, Ont., will build an addition to its plant, at a cost of \$15,000, for the manufacture of plumbers' supplies, brass fittings, etc.

Van Sycle & Macdonald, Vancouver, B. C., propose to establish a shipbuilding plant at New Westminster, B. C., at a cost of \$50,000.

The Canadian Fasteners, Ltd., Hamilton, Ont., recently incorporated to manufacture fasteners, hooks, etc., will shortly call for tenders for the erection of a concrete and brick factory to cost \$20,000.

The Northern Bolt & Screw Co., Seventeenth Street East, Owen Sound, Ont., is contemplating the erection of a factory to cost \$300,000.

The Willys-Overland, Ltd., Weston Road, Toronto, manufacturer of automobiles, etc., have had plans prepared for the erection of a brick and concrete factory.

The Maloney Electric Co., Mercer Street, Windsor, Ont., is erecting a reinforced concrete and brick addition to its plant at a cost of \$12,000. William Kerr is manager.

Contracts have been awarded for the erection of a machine shop to cost \$15,000 for the Canadian Ingersoll-Rand Co., Sherbrooke, Que.

Joliette, Que., will shortly be in the market for new electrical equipment for its power plant. Alfred L. Marsolais is secretary-treasurer.

The John Inglis Co., 14 Strachan Avenue, Toronto, Ont., will build a concrete and brick power station to cost \$5,000.

The Canada Screw Co., 334 Wellington Street West, Hamilton, Ont., is completing arrangements for the erection of an addition to its plant to cost \$100,000.

The Herbert Morris Crane & Hoist Co., Ltd., Toronto, which is building a plant at Niagara Falls, Ont., awarded a contract to the Dominion Bridge Co. for the structural steel only, and not for the erection of the plant, as was erroneously stated. M. R. Malcolm is general manager.

## Effect of Time of Heating and of Fuel on Malleable Castings

In order to ascertain the influence of the time of heating and of the fuel used on the properties of malleable castings, F. Wuest and E. Luenenberger, in a recent issue of *Ferrum*, a German technical paper, published the results of some of these experiments. The conclusions as given by a translator in the London *Iron and Coal Trades Review* are as follows:

Material cast from an oil furnace, owing to low sulphur content, is much superior to that from a cupola in elongation, contraction and tensile strength.

With increase in time of heating, the tensile strength decreases at first slowly and then rapidly, with the elongation and contraction correspondingly increased.

With increased time the toughness and resistance to shock are considerably increased.

Hardness decreases with increased time of heating.

With heating the specific gravity decreases but the time has little influence. Increased silicon content lowers the specific gravity considerably.

The Cohoes Rolling Mill Co., Cohoes, N. Y., is rebuilding its plant which was destroyed by fire a few months ago.



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